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As developed for a 6th grade outdoor education program, this curriculum guide is organized around a common core designed to teach conservation and appreciation of natural resources. Program initiation, methods and procedures, information on natural resources, suggested time schedules, learning activities, nature hikes, and field trips are discussed to familiarize the teacher with the program. Maps, charts, and illustrations add detail to the narrative, explaining the outdoor laboratory school. Supporting programs in astronomy, art, health and safety, weather, recreation, and various work projects are designed to add enrichment to the basic core. Rules for students, letters to parents, materials and equipment lists, and various forms utilized are contained in the Appendix. (SW)

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OUTDOOR EDUCATION

CURRICULUM GUIDE

GRADE 6

Jefferson County Public Schools
1580 Yarrow Street
Lakewood, Colorado

1963

Forbes Bottomly,
Superintendent of Schools

RC 002671

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FOREWORD

The free enterprise economic system of this country is based upon the use of our natural resources. Our natural resources are finite. The preservation of free system surely depends upon the conservation and proper exploitation of Mother Nature's treasures.

During the next forty years, incredible pressures will be placed on our resources. The population of the United States will double. The world's population will reach at least six billion persons. The cold war with its far-reaching military and economic demands will undoubtedly continue. Everywhere there will be increasing persuasion for higher living standards and greater per capita consumption of goods.

Yet we see about us abundant evidence of man's ignorance about and willful disrespect for nature and her resources. Priceless stands of timber are being rendered scorched and useless through man's carelessness. Soil erosion still yearly strips away tons of our fertile topsoils. Raging floods annually inundate river valleys. Scarce and precious minerals are being wasted through defective extraction and processing methods. Streams are being polluted. Man-made chemicals are poisoning soil, water, and air. Recent studies by biological scientists show us how we are not only through our ignorance and lack of values plundering our planet but breaking down nature's finely-balanced ecology and delicately assembled web of life.

The purpose of outdoor education is to teach youngsters a greater understanding and appreciation of the relationship of our economy -- indeed, our present and future well-being -- to nature and her ways. It attempts to teach understanding through reading, study, demonstration, and out-of-door laboratory experience. In God's own classroom boys and girls may see, hear, feel, taste, and take on a kinesthetic awareness of the materials which make up the cycle of life. With whatever teaching props technological man may develop, he can never adequately reproduce the out-of-doors in a schoolhouse. Nature study, geology, ecology, botany, astronomy, and many other natural sciences can best be taught in nature-land. Notwithstanding the other things learned -- a sense of duty and responsibility, a comradeship, a self-reliance, an intellectual curiosity, and an appreciation of natural beauty -- it is our philosophy that outdoor education provides significant and vital experiences for our children.

Forbes Bottomly

Forbes Bottomly, Superintendent
Jefferson County Public Schools

ACKNOWLEDGEMENT

It would be difficult to mention all the people who had a part in the development of this guide. Some of the participants were not members of the Jefferson County School's staff. Teachers, principals, administrative staff personnel, maintenance men and specialists from state and federal departments contributed their time and talents to the program.

The majority of the work was done by a few members of the R-I personnel who worked during the summer. Special recognition should be given to Lee Schumann who played an active part in the development of the program, served as the typist, researched many areas that accurate information might be used, and helped chart both of the mountain trails. Gene Cosby located and organized the general information materials, helped chart the trails, coordinated the taped information used to describe each point on the trails and assisted the maintenance department with numbering and placing the trail markers. Myron Sommers played a major role in structuring the program and locating much of the information used.

Altadean Stroo planned the "ON THE WAY" trail. She spent several days at the Outdoor Education School site and selected specimens of the twelve most common rocks and with the aid of Mr. Stroo made six kits to be used for their exibition. A description of each specimen is included in the kits. Schools will be able to check-out the kits during their pre-planning period. This will make it possible for the children to identify the rocks when they visit the school. She also found some interesting fossils which will be available. The fossils come from the Red Rocks area, which is included in the "ON THE WAY" trail.

The Department of Instruction is grateful to everyone who had a part in the preparation of the guide and wish to acknowledge their contribution. They are indebted to the committee who developed the first Outdoor Education program. Much of this material was helpful in preparing the second edition.

PROGRAM COMMITTEE

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Michael Cussin	Slater School, Classroom Teacher
Gene Cosby	Martensen School, Principal
Lois Dunn	Assistant Coordinator of Curriculum
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Irene Z. Dunstan	Coordinator of Curriculum

CONTRIBUTORS

The physical education and recreation program was prepared under the direction of Lenna Payton, Supervisor of Elementary Physical Education. She was assisted by Emma Curtis, Fremont School and Lloyd Carlton, Mountain View School, both physical education teachers.

Dr. Paul McRill, Supervisor of Foreign Languages did the clever illustrations. Mary Sawyer, art teacher at Fitzmorris School is responsible for the other excellent drawings.

Robert Wohlford, from the R-1 Printing Staff assisted in the placement of the photographs and illustrations.

Roy Van Dyke, in charge of publicity for the R-1 Schools, did some of the photographic work and served in an advisory capacity.

Sylvia Brummett, music teacher for Drake Junior High School and counselor during the summer at the Outdoor Education School, is responsible for the majority of the excellent photographs of the school.

To Dick Stapp and his maintenance crew who made and cooperated in the placing of the trail markers goes a great big THANK YOU!

Seldom is a school system fortunate enough to have the services of more than one specialist, but the writing committee had not one, but four. The interest these men demonstrated in the Outdoor Education program deserves the gratitude of the Division of Instruction and every teacher and child who participates in the program. Their willingness to work with the R-1 Staff, to share their knowledge that boys and girls might develop an understanding and a love for nature makes one proud to know that the R-1 Schools are providing an opportunity for the children to develop the same appreciation for nature and a desire to preserve her gifts to mankind that other boys and girls may have the same opportunity.

The Jefferson County Schools are grateful to the following men who assisted the committee and to the departments they represented for their contribution to the program:

Keith Hay	Colorado Game and Fish Department
Granville Lloyd	Arapahoe National Forest
Gene Harrington	Botanist, State Department of Education
Dr. E. H. Brunquist	Denver Museum of National History

To Mrs. Irene Z. Dunstan, Coordinator of Curriculum, who worked with the committee during the development of the program we extend our thanks.

Lawrence M. Watts
Assistant Superintendent in
Charge of Instruction

PREFACE

The committee charged with the development of this guide spent a great deal of time discussing the format to be used. They recognized the wide variety of backgrounds of both teachers and pupils who would be participating in the program. The need for detailed information was cause for much concern. Major consideration was given to the organization of the program, the selection of the content, activities to use, type of evaluation and to what extent related information, references and resources should be included.

The real goal of the committee was to organize the program in a way that the natural resources of the school site would be used to provide many unique learning experiences. They felt it would be unrealistic to develop a formally organized program and they try to implement it in the beautiful natural setting of the school.

The accepted underlying philosophy for the program has been to include only those learning experiences that could not be taught in the classroom. The need for this approach is further emphasized when a person visits the Outdoor Laboratory School. He cannot help but be thrilled with the many opportunities offered the children and teachers to discover and explore many of nature's secrets. In fact, they are so numerous that some direction to the learning experiences is necessary if the relationships of the many natural resources is understood (the ecology concept).

Contents of Core Program

The committee decided to organize the entire program around a common core of learning that did not have a subject label. They felt in its development they could recognize the four dimensions necessary for a good core program organization, content, process and the quality of living together. This did not appear to be a formidable task. The committee was dedicated to the philosophy that the purpose of outdoor education was to teach conservation and appreciation of our natural resources. In keeping with this philosophy, all agreed that the theme for the core program (basic) should be Conservation and Appreciation.

The content selected and used for the development of the theme would be drawn from the natural areas found at the school's site. The activities used to make the information meaningful would be the experiences provided for the children by following the three trails "ON THE WAY," "THE MEADOWS" and "THE MOUNTAINEER." This would compose the core or basic program that all groups would be required to take. These experiences would serve to develop the ecology concept which is the science that deals with the relation of living things to their environment and to each other.

After the children and the teachers have had the experiences included in the core program, they might like to study some core areas more in detail. That this need might be met, the guide has included a great deal of related materials that can be used for enrichment. This is an optional part of the program and teachers may use it or they should feel free to initiate programs in other conservation areas that the children have indicated an interest. Teachers when planning experiences other than those included in the guide, should exercise care in the planning and time in the schedule should be available for worthwhile experiences. The school site offers so many interesting areas for learning that every effort should be made to have the children utilize the time effectively.

THE CORE PROGRAM

The program is introduced in a most interesting and informal way. The subject content is presented in narrative form, but includes all the necessary information the teacher will need to develop the basic attitudes, understandings, and skills for the children to have a wonderful experience studying the natural environment at the school site.

For the conservation and appreciation concepts to be developed it is imperative that the children be thoroughly familiar with the information given in the guide preceeding the trails' section. If this is done, the children will be so familiar with the information that as they travel the trails they will be able to relate and identify what they have learned in the classroom to the actual specimens they find along the trail. If the children can do this, and be stimulated to apply the experiences to other meaningful situations, the teacher should feel rewarded. It should be emphasized that the teacher must be familiar with the program, its development, and the opportunity he has been given to teach "conservation and appreciation" in nature's great outdoors. The teacher must recognize that unless he relates the elements found in the natural environment to that environment and to each other, he will have only provided the children with many unrelated, though interesting experiences.

Irene Z. Dunstan

Irene Z. Dunstan, Curriculum Coordinator
Jefferson County Public Schools

OBJECTIVES

1. To develop an awareness of the importance of conserving our natural resources which provide us with food, clothing, and shelter.
2. To grasp scientific understandings by seeing these features in their natural setting instead of just reading descriptions in a book.
3. To develop an awareness that all things in nature constantly change.
4. To promote an understanding of the interdependency of the various facets of nature.
5. To give students an opportunity to share knowledge and experiences with classmates.
6. To encourage good health practices.
7. To develop individual skills for leisure time activities.
8. To develop self-reliance as well as cooperation.
9. To recognize the values derived from an informal group-living experience.
10. To develop an awareness, appreciation, and an affection for nature by emphasizing that the purpose of resource management is to benefit people.

OUTDOOR EDUCATION LABORATORY SCHOOL PERSONNEL

The Outdoor Education Laboratory School is unique in several respects. Located as it is, quite removed from the central administrative unit, makes close communication vitally important if the school is to operate efficiently. Careful planning and close cooperation between the two staffs involved is imperative.

The Outdoor Education School maintains a permanent staff consisting of the following:

Principal - serves as the chief administrator of school
Program Coordinator - is responsible for working with the various groups who come to the school
School Nurse - is responsible for the health and welfare of all personnel
Food Service Department - is responsible for the preparation of the food
Maintenance Department - is responsible for keeping the physical plant in working order and sanitary

Several groups of sixth grade pupils accompanied by their teachers come to the school each week for their instructional program. The teachers are considered temporary personnel and work closely with the Outdoor Education Laboratory School's staff.

The visiting personnel might vary depending on the program planned. In general this staff will include:

The principal or principals of the participating schools
The classroom teachers of the children attending
Special teachers -- art, music, and physical education
Resource Consultants

If the program is to function efficiently, it is imperative that policies and procedures be outlined to meet the general operational needs of the school.

That each person participating may know how he relates to the other members of the staff the responsibilities for each has been defined and included in the guide.

ROLE OF THE PRINCIPAL OF THE LABORATORY SCHOOL

The principal of the Outdoor Education Laboratory School assumes the same leadership role as does the principal of the regular school, in addition to those responsibilities peculiar to the Laboratory School.

The principal is both an administrator and educator. Members of the school's staff look to him for direction at all times. Any exceptions to procedures and policies are his responsibility. The safety and welfare of the personnel, both visiting groups and regular staff, should be his concern. Adequate water, food, medical supplies, light, and fuel supplies are procured and dispensed at his direction. He is the legal representative of the Superintendent of the R-1 Schools.

His role as an educator is no less important. The general direction of the instructional program must be assumed by him. To do this, he must be thoroughly indoctrinated with the concepts of this type of program. He must see that an adequate instructional program in the total scope of district educational philosophy is carried out at all times. In detail, this means that there are adequate supplies and instructional materials available; that the grounds, buildings and equipment are in safe condition at all times; and that all areas visited by the children are carefully scrutinized for any hazard. If any are found, he should take steps to prevent mishaps.

He should work directly with the program coordinator in arranging facilities that the best possible learning situation possible is provided.

The principal of the Outdoor Education Laboratory School is the liaison between the public and the school system. The school, by nature of its uniqueness, will draw many visitors, official and otherwise; these should be made to feel welcome. If they wish, they should be given a tour of the school and grounds with the exception of the staff's quarters. Every effort should be made to explain the activities and objectives of the school. Visitors should leave with a desire to return and, if they are parents, should leave with the satisfaction of knowing that their children will receive both excellent care and quality instruction.

Extreme and unusual discipline and emotional problems should require his attention. Parents of the children involved should be contacted when the staff feel the situation is of such serious nature the general rapport of the school is being effected. Every effort should be made to counsel the child concerned that he might be able to remain for the intended length of time.

Keeping the cooks happy will be reflected in relation to the food service. Changes in schedules, unexpected guests, and food delivery problems are but a few of the more common problems he will be called upon from time to time to work out with the cooks.

ROLE OF THE OUTDOOR EDUCATION PROGRAM COORDINATOR

The program coordinator must be sold on the philosophy of outdoor education. He will be the one who works directly with the classroom teachers and principals of the schools who will be visiting the laboratory school. Through his contact with them they will be made to feel that they are a functional part of the program.

The program coordinator will meet at least once with the school's staff for preliminary planning at least three weeks prior to the date they are scheduled to visit the school. He should have many well-organized suggestions ready to share with the teachers and principals. He should keep in mind at all times that he is there to assist; that the program is theirs and he is serving as a resource person. He should not be expected to plan their program for them.

The coordinator, because of his experience at the school, should be of great assistance in program planning and schedule making. After reviewing their plans, he should be able to give suggestions for program improvement, appropriate time needed for the different activities, and assignment of space and facilities.

The coordinator should see that any special arrangements necessary to fit the plans of a particular program are completed and available to the group when needed. His major concern is to maintain a happy, closely knit staff during each group visit. If the staff is a happy one, its enthusiasm and stability will certainly enhance its abilities and be transmitted to the children for whom the staff is responsible.

The coordinator should work through the group's chairman, who is serving during the entire time as a liaison person, having been elected by the group prior to coming to the school. Any changes in schedule, behavior problems and failure of teachers to function according to plan should all be worked out through the chairman. However, if the chairman should desire to seek a conference with all the visiting staff members, he may do so. The amount of his participation in the visiting school's program should be determined by the laboratory school principal in cooperation with the program coordinator.

The program coordinator is responsible to the principal of the Outdoor Education Laboratory School.

ROLE OF THE BUILDING PRINCIPAL

The principal plays an important part in the success of his pupils' experiences at the Outdoor Education Laboratory School. The amount of enthusiasm he evidences for the program when he introduces it to members of his staff will influence their attitude toward the program.

The principal should take an active part in planning the entire experience. He should work with the sixth grade teachers who will be taking part in the program, even in the initial stages. The general plans should be approved by him before they are formalized. He should be present when the program coordinator meets with the teachers to plan the complete week's outdoor education schedule. He should assist with the scheduling of the special teachers (music, art, and physical education). When other schools are sharing the program, he should provide adequate time for joint planning with all teachers involved. The principal should be responsible for making arrangements for a school nurse to give a final check to each student before departing for the school.

One of the most important responsibilities of the principal is that of keeping his community informed of the advantages of the children participating in the outdoor education program. Sometimes he might need to take the initiative to get the information across.

The principal should plan to spend at least one day at the laboratory school during the week that his sixth grade classes are there. He should be of help in any way that the outdoor education staff may request. Principals who desire to participate by teaching or leading the group on a trail are encouraged to do so. This should be decided during the pre-planning session.

All communications with regard to the program must come from the principal's office. This would include the letter from the superintendent of schools describing the program, and the letter to the parents with the parent permission slip attached.

Certain information on each child is required to accompany him to the school. This includes a list of the child's name, parent's name, address and place of employment, home telephone, family doctor, and any special health or medical information the school should have.

The principal should cooperate closely with the group chairman. Any matters of a serious nature should be discussed with him; if they are not resolved, they should be taken up with the principal of the laboratory school. He should also be free to work with his teachers during the week on matters dealing with situations peculiar to his school.

ROLE OF THE TEACHER CHAIRMAN

Several classroom teachers will be involved in the program at the same time. The Outdoor Education Laboratory School has accommodations for one hundred twenty pupils at one time. This number of pupils would require the attendance of at least four to five regular classroom teachers. Some of the activities will offer opportunity for the entire number to participate; at other times at least five separate groups may be formed; again two to three groups may work together. In addition to the regular classroom teacher, art, music, and physical education teachers may be present. That some one person may serve as a coordinator of the groups' activities, a teacher chairman should be elected by the group at the first pre-planning general meeting. This person should serve as a liaison between the teachers and the Outdoor Education Laboratory School's staff.

The teacher chairman should preside at all conferences or meetings.

He should be available for individual or group conferences with teacher members.

He should represent the teacher group in all matters with respect to the staff of the Outdoor Education Laboratory School.

The chairman should see that all necessary supplies and equipment are available and ready for use when needed.

Changes made in the assignment of teaching personnel should be under his supervision.

He should work with the principals, whose staffs are participating, in matters affecting administrative policies at the local level.

Behavior problems reported by the school's staff should be referred to him, and he in turn should work with the classroom teacher representing the group.

Requisitions for supplies for the school's staff should be processed through the chairman.

Local principals should discuss any problems with the laboratory school principal or program coordinator, and they in turn would mention it to the teacher chairman if they felt it necessary.

The teacher chairman is responsible to the Outdoor Education Laboratory School Principal during his stay at the school; any changes in schedules, plans, etc., should be approved by him or the program coordinator depending on the nature of the need.

ROLE OF THE CLASSROOM TEACHER

The classroom teacher is the key to a successful outdoor education program. The teacher must, through his own enthusiasm, create a climate where each child is eager to explore and discover nature first-hand.

The teacher must plan carefully and be very familiar with the program and its needs before he begins to plan with the group. It should have been discussed with the principal prior to this time. If this is not done, time will be consumed and interest dissipated when it becomes apparent that changes have to be made.

The teacher should be thoroughly familiar with the Outdoor Education Guide before he meets with the program coordinator for the pre-planning session. The teacher should have plans ready to discuss with the coordinator when he meets with the group. While plans, schedules, etc., cannot be definitely made he should have ideas to discuss with the coordinator.

As soon as the teacher is familiar with the general program and the facilities at the school, he should introduce the subject to the pupils. Their reaction will depend upon the enthusiasm evidenced by the teacher.

The children can supply many questions and suggestions. Their part in the program will be vital to the success of the week's experiences. They will be anxious to know what their responsibilities will be, what supplies they will need to take with them etc. The teacher should provide time for all children to ask questions and for him to answer them; this technique will make it possible for the teacher to supply a great deal of necessary information without becoming directive.

The teacher should work closely with the principal during the entire planning period to ensure the general welfare of all children and the success of the program.

The most interesting part of the experience begins when the group arrives at the school and actual program experiences begin. The teacher, with occasional assistance from the school's staff, begins to move into the program he and the children have spent so much time preparing. The trails are so well described that children if given an opportunity to become familiar with the points of interest could well enough serve as guides. By assigning a child or group to each point on the trail many children could be a real part in the program. If the schedule could be arranged to permit the "pupil guides" to have a trail run with someone familiar with the trail prior to the entire group's trip, he would do a better job.

At all times the classroom teacher is responsible for the supervision and behavior of his group unless relieved of that duty for short periods of time by another member of the staff, or by a teacher from another group that is sharing the week's program.

Whenever the classroom teacher feels that changes should be made in the schedule, the nature of the program planned, group behavior, lack of supplies, etc., he should contact his group's chairman, who in turn will discuss the situation with either the program coordinator or school principal depending on the nature of the problem. All teachers are responsible to the chairman who is responsible to the laboratory school principal. He should be present and participate to some degree in every major experience the children have. Every teacher should walk both trails unless physically unable to do so. They provide the working first-hand knowledge for the entire program. This does not mean they serve as the guide but they can stimulate questions, ask a few questions, point out interesting items, keep the group together, and add to the pleasures of the children by letting them know their teacher is interested in sharing the experiences with them.

When the children return to the classroom, the teacher should assist them in assembling any materials they have brought back with them. (Teachers should instruct the students to not take specimens from the trail. Specimens may be collected 100 feet away from the trail.) Together they should discuss the experience, and summarize the learning experiences they had during the week.

As they continue to work together many opportunities will be presented for the children to relate their outdoor learning to new situations. The teacher should be alert and take advantage of them. Real "conservation," the theme for the outdoor education program, will take place only when enough classroom teachers get into the field and have first-hand experience on which to base their teaching. Teachers must first have learned through doing if they are to feel secure in directing the activities of children in similar situations outside the classroom.

ROLE OF THE SPECIAL TEACHER

The special teacher plays an important role in the success of the outdoor education program. Due to his specialization, he has the opportunity to enrich certain areas that otherwise might be treated in regular classroom fashion.

His responsibilities should be established in the pre-planning sessions. They should be clearly defined. Any assignment given a special teacher should require a time assignment of at least one-half day.

Activities for each group, or for the entire group, should be carefully scheduled so that maximmm use may be made of the specialist's time.

It is recommended that the children be given music twice each week, and that a planned art program be offered once a week with enough time allowed that the children's projects may be completed, or nearly so.

When children have completed projects, provision should be made for satisfactory storage until the group returns to its home school.

Physical education teachers should be used for assignments that require special training, or when the classroom teacher is physically unable to direct the activity. If a classroom teacher is able to handle the activity, it is recommended that he do so rather than take a physical education teacher from his regular schedule.

At no time should more than one special teacher be scheduled for any subject; for example, if two schools are in attendance, only one art teacher should be scheduled.

The special teacher is responsible for materials, equipment, etc., needed to implement his program. He should check to see that sufficient amounts of the basic materials listed in the guide are available at the laboratory school to meet his needs and should bring with him any special items peculiar to his program.

Upon arriving at the school, the special teacher should report to the principal's office so that the group's chairman may be notified that he has arrived. He is responsible to his teacher chairman, who in turn is responsible to the laboratory school principal.

The time the special teacher reports back to his assigned school should be determined by his school principal.

THE OUTDOOR EDUCATION LABORATORY SCHOOL NURSE

The nurse plays an important part in the Outdoor Education Laboratory School's health program. Because of her special training, she assumes the major responsibility for the school's health services. The nurse is responsible to the principal of the school.

The nurse spends four hours each week day the school is in session; this includes her travel time. On the day of the children's arrival, she checks all of the children the same afternoon. On the day of departure all children are checked before leaving for home. On all other days she concerns herself with health problems referred to her, or with children who voluntarily come to the clinic.

The nurse administers first aid and performs all other services normally assigned to a school nurse. In addition to this, she carries out the following duties:

> Consults with the school's doctor in serious cases, and follows with any treatment he may prescribe.
>
> Contacts parents in cases of serious illness or accidents.
>
> Keeps clinic sanitary and supplied with adequate supplies and equipment.
>
> Gives health instruction to visiting groups when requested; may also volunteer her services.
>
> Conforts and counsels homesick children.
>
> Keeps a daily record of all children seen at the clinic.
>
> Records on child's Emergency Card the clinic visit, date, reason for the visit, treatment, and any other pertinent information.
>
> Performs such other duties as may be assigned by the principal of the Outdoor Education Laboratory School.

FOOD SERVICE DEPARTMENT

The manager and her assistants are responsible to the principal of the Outdoor Education School. They work closely with the principal to ensure satisfactory operation of the cafeteria.

She is responsible for the planning and preparing the food for family style serving.

Children attending the school are responsible for taking the food from the kitchen to the cafeteria and returning the dishes at the close of the meal.

MAINTENANCE DEPARTMENT

The maintenance department for the Outdoor Education School is responsible to the principal of the school. He performs the same duties as custodians in other schools. The care of the dining room, dormitories, and other buildings are included in his responsibilities. Other maintenance duties may also be assigned by the principal of the school.

PART II

Initiating The Program

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Charts

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PRE-PLANNING

Instructional Procedure

The reason for the existence of the Outdoor Education Laboratory School is to teach children the importance of conservation, preservation, and appreciation of their great heritage. Jefferson County sixth graders will spend only one week at the Outdoor Laboratory, but they will need much advanced preparation for their week's stay. The CORE PROGRAM should receive much attention in this period of preparation. This is the very heart of the material that must be presented in order to accomplish the task of teaching our children that the nation that is strong is the nation that manages and uses its natural resources wisely. Teachers may then weave into their program subjects from the Related Program.

Time

The amount of time spent in pre-planning and preparing for the week at the Outdoor Laboratory will vary depending upon the interests and background of teacher and pupils. We are suggesting that a class will need three or four weeks preparation and study in order to obtain optiumu benefit from the Outdorr Education Laboratory School.

Methods and Procedures

There are as many methods and procedures as there are teachers. The teacher should proceed with his/her own ideas as long as they are in keeping with the purposes and policies established by R-1.

Begin with a discussion of the objectives of Outdoor Education. Give opportunity for children to express themselves about previous outdoor experiences.

Acquaint children with new terminology.* These terms are only a few of the new vocabulary words with which students will become familiar.

Acquaint students with the basic principles of conservation and present the General Information for the Core Program. Important to the Core Program is the philosophy of conservation behind each of the following areas: rocks and minerals, soil, water, forests, wildlife, forage, and recreation.

The knowledge gained through the Core Program is directly related to the experiences the students will have on the trails of the Outdoor Laboratory and the development of the basic concepts of conservation.

* see page 36

TEACHING CONSERVATION TO CHILDREN*

The word "conservation" has a thrifty meaning. The idea of conservation is to use resources wisely, to leave what we ourselves enjoy in such good condition that others may also share the enjoyment. It is the opposite of extravagance and wastefulness. The broad significance of conservation should be made part of the awareness of everyone.

To understand the function of the water table in the ground is just as important as a knowledge of the three R's. American children should learn why all watersheds need the protection of plant life. They should learn why the running current of brooks and rivers must be made to yield their full benefit to the soil before they finally escape to the sea. Children must come to see that most of the land drainage accomplished in the United States has led to results in which the damage has far outweighed the good.

Children should be taught the duty of planting trees as well as of cutting them. They should realize that the old-fashioned custom of stripping woodlands clean and then burning the trash is completely obsolete. They should learn the ecological importance of big, mature trees. They must be informed that wildflowers are best enjoyed where they grow instead of in vases.

Children must be made aware of the fundamental error behind most attempts to "control" animals supposed objectionable to man. As a matter of fact, we cannot indiscriminately kill off even insects on a large scale without danger of doing some harm to nature and ourselves. We need to teach them that game is a crop of which we can harvest only the surplus; that nature is most vigorous and rewarding when as many as possible of its elements are left in their primeval relation with the eaters as well as the eaten recognized as desirable parts of the whole.

The conservation of all natural resources and the encouragement of a varied wildlife surely promotes the best possible world for man himself.

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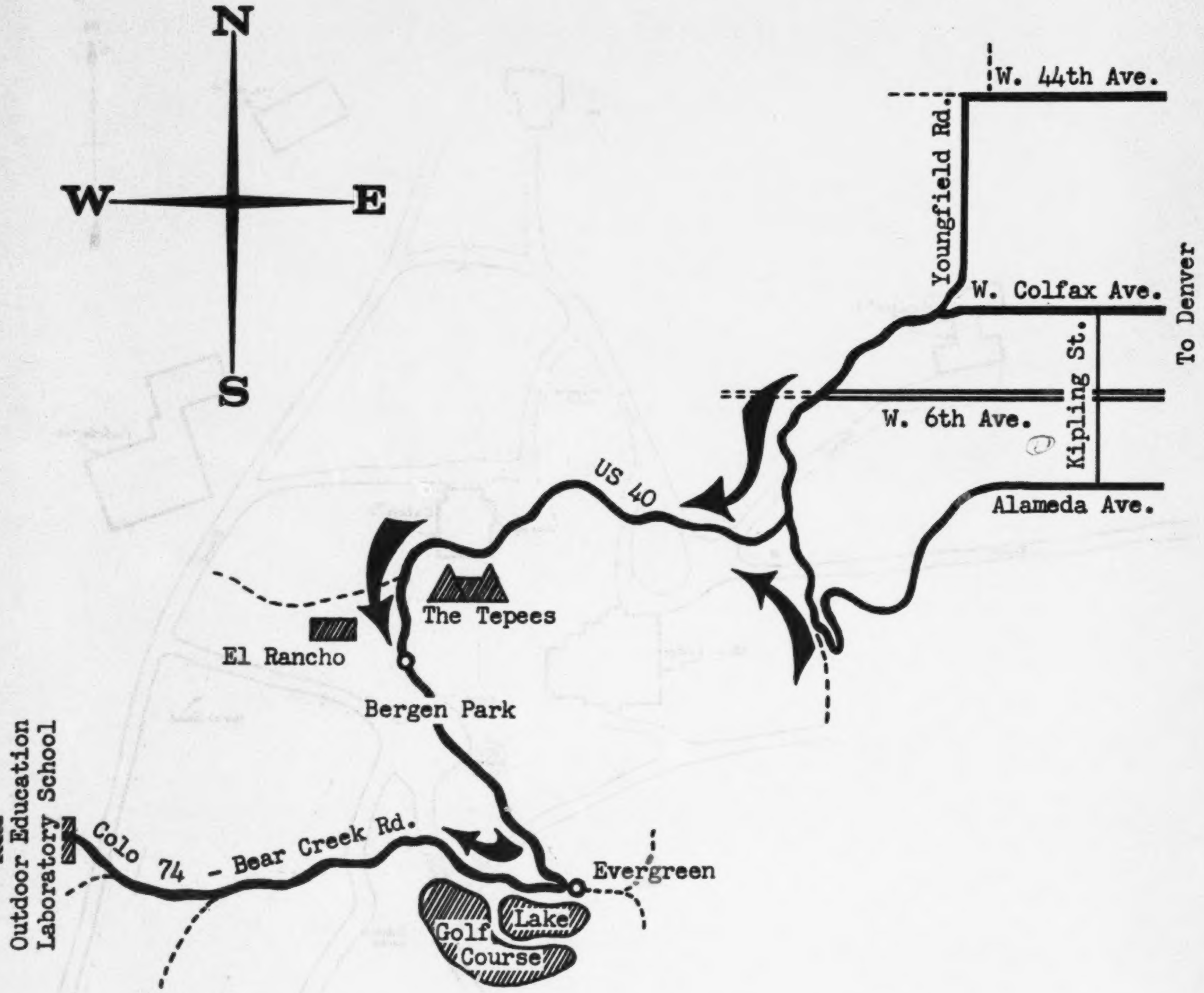
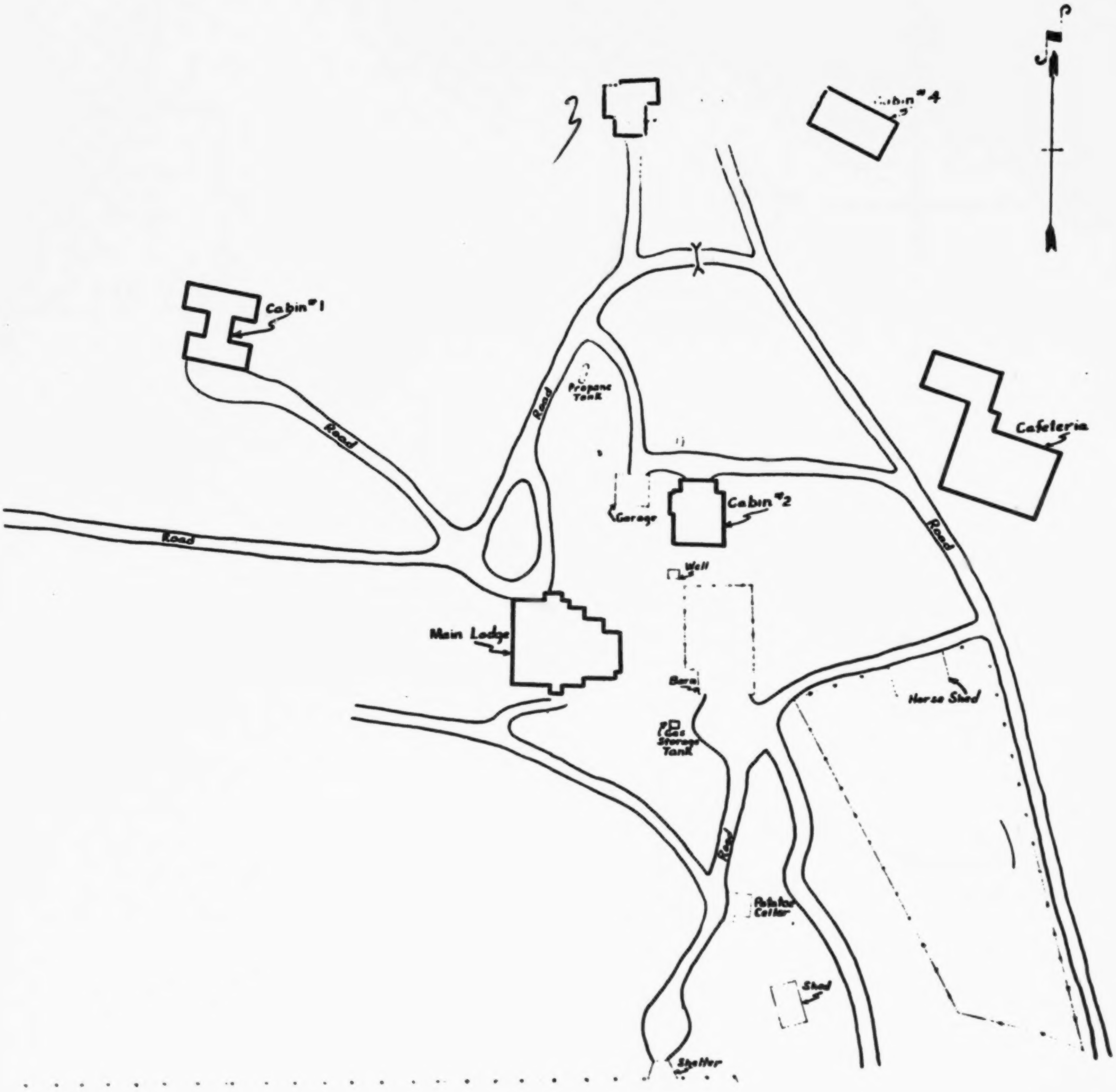
*"Conservation for Everybody", by Robert Murphy, Curator Emeritus of Birds, The American Museum of Natural History, New York City, N.Y.


N
W
E
S
W. 44th Ave.
Youngfield Rd.
W. Colfax Ave.
To Denver
Kipling St.
W. 6th Ave.
Alameda Ave.
US 40
The Tepees
El Rancho
Bergen Park
Outdoor Education Laboratory School
Colo 74 - Bear Creek Rd.
Evergreen
Lake
Golf Course

MAP OF ROUTE TO OUTDOOR EDUCATION LABORATORY SCHOOL

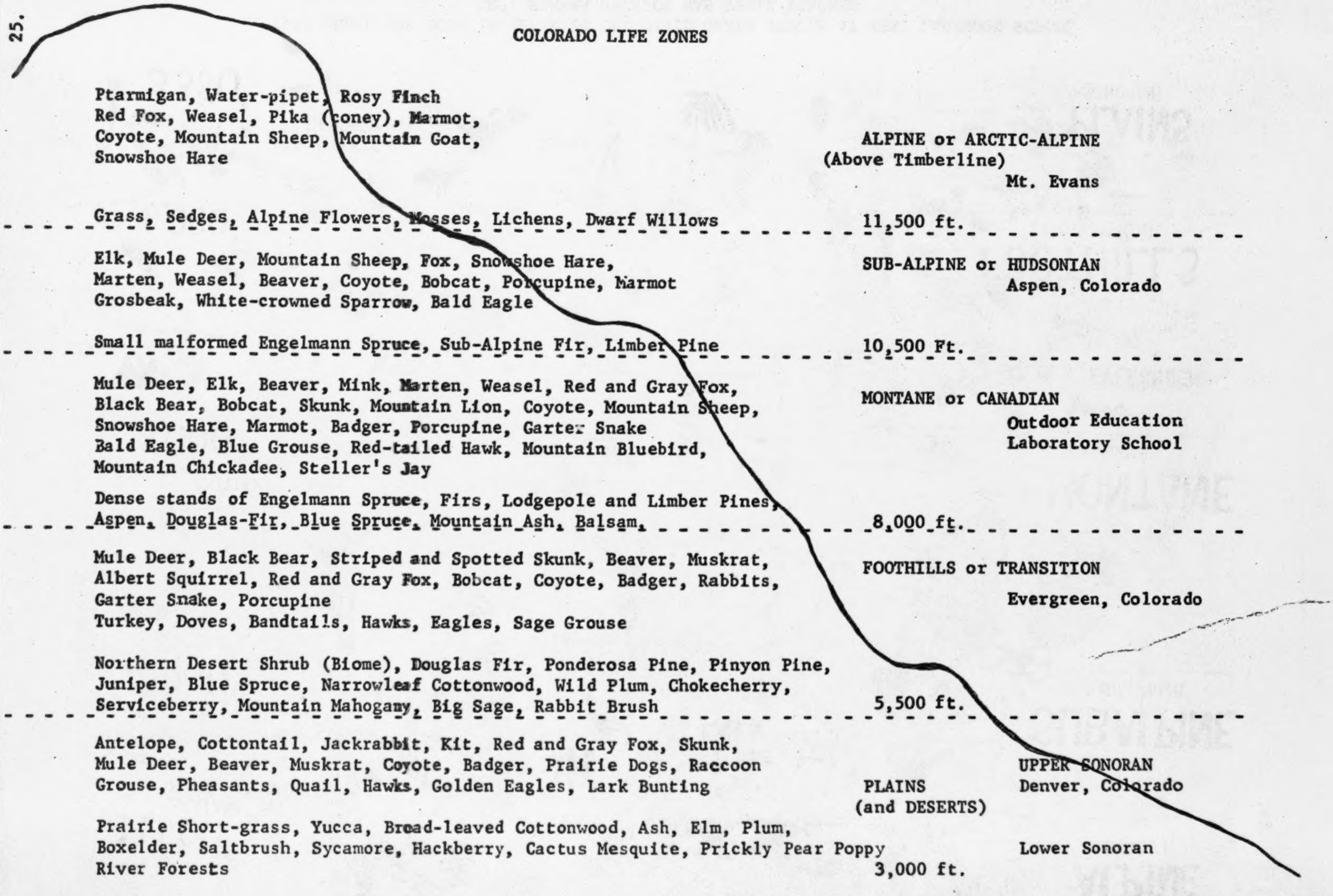
Go west on Alameda Ave., W. 6th Ave., W. Colfax Ave., or W. 44th Ave. to reach US 40. Follow US 40 to the Tepees Restaurant; take the Bergen Park Road to Evergreen Lake, then right past the Golf Course on to the Outdoor Education Laboratory School.


3
abin #4
Cabin #1
Road
Propane Tank
Road
Cafeteria
Garage
Cabin #2
Road
Road
Well
Main Lodge
Barn
Horse Shed
Gas Storage Tank
Road
Potato Cellar
Shed
Shelter

SITE PLAN OUTDOOR EDUCATION LABORATORY SCHOOL

The Jefferson County Outdoor Education Laboratory School is located nine miles west of Evergreen, Colorado, on 550 acres which formerly were part of the C. Phelps Dodge Ranch. The area is in the Montane Life Zone, since it lies at an altitude of 8,000 feet. The Mt. Evans Range can be seen to the west. The accompanying photograph includes the buildings on the site.

COLORADO LIFE ZONES



Ptarmigan, Water-pipet, Rosy Finch
Red Fox, Weasel, Pika (coney), Marmot,
Coyote, Mountain Sheep, Mountain Goat,
Snowshoe Hare

ALPINE or ARCTIC-ALPINE
(Above Timberline)
Mt. Evans

Grass, Sedges, Alpine Flowers, Mosses, Lichens, Dwarf Willows

11,500 ft.

Elk, Mule Deer, Mountain Sheep, Fox, Snowshoe Hare,
Marten, Weasel, Beaver, Coyote, Bobcat, Porcupine, Marmot
Grosbeak, White-crowned Sparrow, Bald Eagle

SUB-ALPINE or HUDSONIAN
Aspen, Colorado

Small malformed Engelmann Spruce, Sub-Alpine Fir, Limber Pine

10,500 Ft.

Mule Deer, Elk, Beaver, Mink, Marten, Weasel, Red and Gray Fox,
Black Bear, Bobcat, Skunk, Mountain Lion, Coyote, Mountain Sheep,
Snowshoe Hare, Marmot, Badger, Porcupine, Garter Snake
Bald Eagle, Blue Grouse, Red-tailed Hawk, Mountain Bluebird,
Mountain Chickadee, Steller's Jay

MONTANE or CANADIAN
Outdoor Education
Laboratory School

Dense stands of Engelmann Spruce, Firs, Lodgepole and Limber Pines,
Aspen, Douglas-Fir, Blue Spruce, Mountain Ash, Balsam,

8,000 ft.

Mule Deer, Black Bear, Striped and Spotted Skunk, Beaver, Muskrat,
Albert Squirrel, Red and Gray Fox, Bobcat, Coyote, Badger, Rabbits,
Garter Snake, Porcupine
Turkey, Doves, Bandtails, Hawks, Eagles, Sage Grouse

FOOTHILLS or TRANSITION
Evergreen, Colorado

Northern Desert Shrub (Biome), Douglas Fir, Ponderosa Pine, Pinyon Pine,
Juniper, Blue Spruce, Narrowleaf Cottonwood, Wild Plum, Chokecherry,
Serviceberry, Mountain Mahogany, Big Sage, Rabbit Brush

5,500 ft.

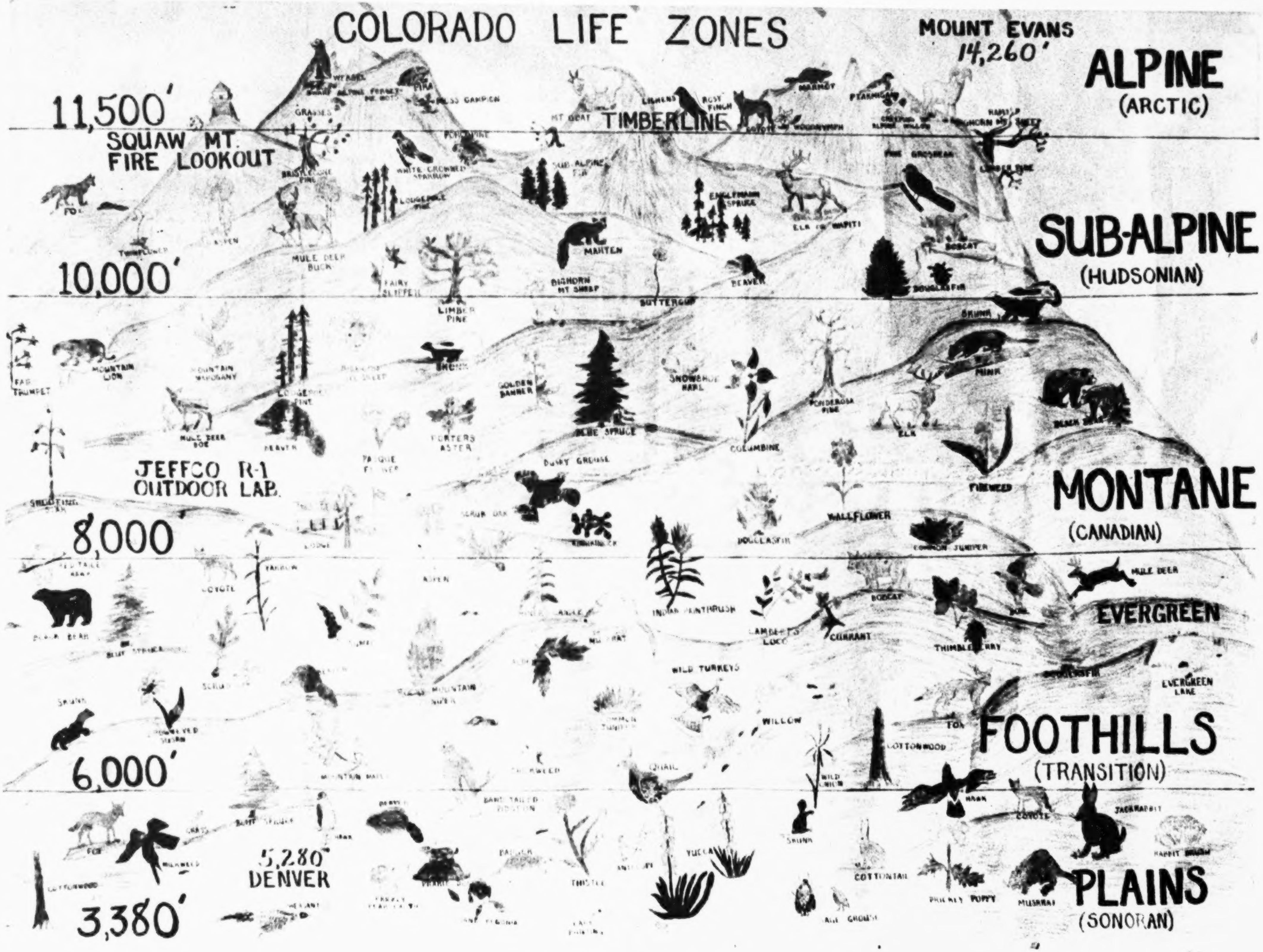
Antelope, Cottontail, Jackrabbit, Kit, Red and Gray Fox, Skunk,
Mule Deer, Beaver, Muskrat, Coyote, Badger, Prairie Dogs, Raccoon
Grouse, Pheasants, Quail, Hawks, Golden Eagles, Lark Bunting

PLAINS
(and DESERTS)

UPPER SONORAN
Denver, Colorado

Prairie Short-grass, Yucca, Broad-leaved Cottonwood, Ash, Elm, Plum,
Boxelder, Saltbrush, Sycamore, Hackberry, Cactus Mesquite, Prickly Pear Poppy
River Forests

Lower Sonoran
3,000 ft.


COLORADO LIFE ZONES
MOUNT EVANS
14,260'
ALPINE
(ARCTIC)
SUB-ALPINE
(HUDSONIAN)
MONTANE
(CANADIAN)
EVERGREEN
FOOTHILLS
(TRANSITION)
PLAINS
(SONORAN)
11,500'
SQUAW MT.
FIRE LOOKOUT
10,000'
JEFFCO R-1
OUTDOOR LAB.
8,000
6,000'
5,280'
DENVER
3,380'
TIMBERLINE
MT GOAT
LICHENS
ROSY FINCH
MARMOT
PTARMIGAN
GRASSES
MOSS CAMPION
PORCUPINE
WHITE CROWNED SPARROW
LODGEPOLE PINE
SUB-ALPINE FIR
ENGELMANN SPRUCE
ELK OR WAPITI
PINE GROSBEAK
LIMBER PINE
BOBCAT
DOUGLAS FIR
FOX
ASPEN
MULE DEER BUCK
FAIRY SLIPPER
MARTEN
BIGHORN MT SHEEP
BUTTERCUP
BEAVER
SKUNK
MOUNTAIN LION
MOUNTAIN MAHOGANY
MULE DEER DOE
GOLDEN BANNER
SNOWSHOE HARE
PONDEROSA PINE
MINK
BLACK BEAR
PORTERS ASTER
BLUE SPRUCE
COLUMBINE
ELK
FIREWEED
DUSKY GROUSE
SCRUB OAK
WALLFLOWER
DOUGLAS FIR
COMMON JUNIPER
KINNIKINICK
SHOOTING STAR
COYOTE
YARROW
INDIAN PAINTBRUSH
LAMBERTS LOCO
CURRANT
BOBCAT
MULE DEER
THIMBLEBERRY
BLACK BEAR
WILD TURKEYS
MOUNTAIN SUGAR
WILLOW
EVERGREEN LAKE
SKUNK
COTTONWOOD
QUAIL
WILD ONION
HAWK
COYOTE
JACKRABBIT
RABBIT BRUSH
FOX
MILKWEED
COTTONWOOD
BAND TAILED PIGEON
THISTLE
YUCCA
SKUNK
COTTONTAIL
PRICKLY POPPY
MUSKRAT
SAGE GROUSE

THIS MURAL WAS DONE IN COLOR BY THE SIXTH GRADE PUPILS AT WEST LAKEWOOD SCHOOL
MRS. SONDRA JACKSON WAS THEIR TEACHER

GENERAL INFORMATION

MULTIPLE USE OF OUR NATURAL RESOURCES

The Term Defined

The U.S. Forest Service considers that there are five primary renewable resources. These are water, recreation, wood, forage, and wildlife. Soil is considered a basic resource, rather than a renewable one. The term "Multiple Use" has been coined by the U.S. Forest Service to define the intent of their program. The Department of Agriculture has learned that an area of land may provide many services for the benefit of the American people, if it is properly managed. "Multiple Use" is a planning concept for managing land.

The first goal of Multiple Use is to manage all the renewable resources of our forest lands so that they are utilized to the fullest extent possible by the American people. A goal of this nature demands that the program be flexible. Good judgment is exercised in the management of these resources. This means that in some areas land will be used for less than all of the five resources because of the danger of destruction of one or more resources.

Multiple Use of our Natural Resources is an effort to coordinate and manage the use of the various resources in a harmonious manner, guarding against impairment of the productivity of the land. Multiple Use is an effort to conserve the basic resource which is soil and at the same time produce high-level, sustained yields of water, recreation, timber, forage, and wildlife for the use and benefit of the greatest number of people.

The Importance of Multiple Use

Our forefathers lived close to the land. They depended on the land for food, for clothing, for shelter, and for fuel. However, modern man has a tendency to lose sight of his dependence on the natural resources of our land. The population of the U.S. is expected to nearly double by the end of this century. Today we depend on natural resources for all the raw materials of industry. Therefore, the wise use of these must be considered in relationship to the fullest possible yield of of all the products and services that forest land provides for people. In just 40 years, the need for wood will be double our requirements of today. In addition to meeting greatly expanded requirements on our wood production, forest land management faces increased demands for other products and services which forests produce.

All domestic and commercial water requirements have doubled in the last 20 years and are expected to double again within the next two decades. More that one-half of all the water of the western United States originates on the national forests. Maintenance of a forest cover on this land protects water quality and quantity. To increase water yield, expert care must be given to the forest cover.

Wise management involved in the expert care of the forest cover will include the proper cutting of timber. In some areas, selective cutting should be used, if the forest cover is quite sparce. Land managers need to be careful that land is not overgrazed by domestic animals or over-browsed by wildlife. When the ground cover is poor, the water run-off is very rapid. This on-rush of water becomes a destroying force causing erosin, polluting streams, and creating damage. Proper ground cover keeps our streams pure and produces good fishing.

Many coniferous U.S. forests and intermingled grasslands are used for grazing of domestic livestock. These same forests provide the habitat for many kinds of wild game. These uses are increasing, also. In a twelve year period beginning with 1948, the recreational use of the forests tripled.

The use of the forests for many purposes is nothing new. In every country and for centuries forest land has been so used. However, there is a growing awareness of the need to apply multiple use management more widely and more intensively. Multiple use management is designed to make forest lands more useful to the public. In most instances, forest lands are not fully serving the people if used exclusively for a single purpose which could also be achieved in combination with several other uses.

The basic purpose of forest conservation is a social one - - to satisfy the intangible as well as the materialistic and economic needs of people.

ROCKS AND MINERALS -- A Non-renewable Resource

Everyone is familiar with rocks. They are one of the most common things in the world. Rocks are so common that it seldom occurs to us that they are very important. Everything that lives on land owes its life to soil and much of the soil about us was once rock. The rich soil was formed by small bits of rocks which were broken into soil by weather and growing plants. The small rock particles were mixed with dead plants and animals and formed rich, productive soil.

There are three main families or groups of rocks. Igneous rocks are very hard. They were formed by fire. These rocks were formed by extreme temperatures inside the earth. Lava from volcanoes is an example of this type of rock. Some of these rocks cooled and hardened slowly under the surface of the ground, while others cooled and hardened on top of the ground. Another family of rocks are Sedimentary. Sedimentary rocks are formed from sediment that settled on land or in water. This type of rock usually has distinct layers. Many sedimentary rocks contain fossils. The third groups of rocks are Metamorphic or "changed rocks." All kinds of rocks can be metamorphosed. The change usually creates crystalline structures, perhaps new minerals, and may even change the texture of the rock. Our earth moves and shifts. Earthquakes cause great changes. Often the rocks are pushed and squeezed in the earth's movements. Some have been pushed deep into the earth where pressure, heat, and gasses have worked on them.

Two kinds of Metamorphic rocks are found in abundance at the site of the Laboratory School. Gneiss (pronounced "nice") is a coarse grained banded rock which was once shale or sandstone. Schist, too, was once sedimentary and is like gneiss but contains more mica. The flakes of mica can easily be seen in rock specimens.

There are also some igneous rocks on the Laboratory School property. Boulder Creek Granite, a hard grayish rock, is present at the site. Pegmatite, a course grained rock with crystals, may be found. Pegmatite quartz, mica, and feldspar can also be located. There is quite a lot of beautiful rose quartz.

Rocks are made up of minerals. Rocks, like cakes, are made up of many ingredients. A cake will have flour, sugar, shortening, eggs, and other substances. Each of them is a substance in itself, but together they make up a cake. Minerals in rocks are separate substances, but together they make up different kinds of rocks. Some rocks consist almost entirely of one kind of mineral. Other rocks may contain scores of minerals in different amounts. The gneiss and schist at the Laboratory School have feldspar, mica, and other rock-forming minerals.

Instructional Aids

Rock kits and colored slides may be obtained through the Instructional Aids Center. The rock kit contains some of the common rocks and minerals found in Jefferson County. The colored slide set shows some of the rock formations between Denver and the Laboratory School.

SOIL -- A Non-renewable Resource

It takes from a hundred to a thousand years to build one inch of top soil. This is under ideal conditions. Soil is considered a basic resource because it is responsible for most of the things we use. More than this, soil is not unlike air and water because it, too, is necessary for all life on our planet. Productive land is essential to the well being of our nation. If our soil is wasted and its productivity is allowed to decline, our nation will not be able to maintain our high standard of living or continue occupying our place of leadership in the world.

Soil conservation means more than preventing erosion, checking the amount of water that runs off the surface of the ground, and putting a halt to the depletion of soil nutrients. The positive view of conservation is using the land to produce the greatest amount of the things most needed while protecting and improving it. We have learned a great deal from experience in our own nation and from the experiences of others. We are no longer satisfied with merely stopping the depletion of our soil, but desire to improve the soil so there will be crops produced in increasing numbers to meet the needs of an increasing population.

The United States did not give much attention to conservation until the 1930's. The Dust Bowl, although detremental, startled a portion of our nation into action. As long as we had plenty of unsettled land, conservation did not seem important. But when unsettled land became scarce, the Soil Conservation Service was organized. Research into better conservation practices was their primary work in the early days. This has resulted in many measures which are taken to help protect and improve our soil today. Terraces, contours, cover crops, strip crops, crop rotation, fertilizers, and various types of plants are tools of conservation. Our forests are managed in such a manner as to assure a protective ground cover and to preserve the soil. In areas of the forest where there is potential damage to the soil, measures are taken to correct this situation. Livestock may not be permitted to graze in this area. Vegetation may be planted. Gullies may be filled with materials that will hold the eroding soil.

Soil is one of our most important resources. Wise use of soil and moisture on croplands, grasslands, and woodlands is the key to keeping our land productive, our people healthy, and our Nation strong and beautiful.

WATER -- A Renewable Resource

What is a water shed? Simply stated, a watershed, or drainage basin, is an area of land from which a stream gets its supply of water. The watershed may cover only a few acres or it may be so large that it covers many square miles. A watershed is a combination of mountains, valleys, streams, forests, grass, farmlands, soil, and also cities, roads, people, and animals.

How the Watershed Operates

An effective watershed is one in which plant growth is present in abundance. The leaves and branches of trees, shrubs, grass, or other plants help break the force of falling rain. Together with the plant litter on the ground, they keep the rain from loosening the soil particles and causing the water to run off too quickly. All the while the litter and the organic materials are rotting and working into the ground, ever improving the spongy, porous nature of the soil.

Because there are many channels in the soil made by roots, burrowing animals, and insects, the water seeps to lower levels. The trees, brush, and all plant growth combine to stop the water from running off the surface too rapidly. Instead of running off, these plants help it to sink into the ground. All of this decaying letter and humus functions like a sponge. It soaks up the moisture. The plants use some of the water. Some of it evaporates, some of it finds its way to streams, and much of it soaks down through the soil, through rock strata, and is stored in the deep underground storage areas.

The Importance of the Watershed

Water is the priceless resource on which all growing things depend. It is the lifeblood of civilization. Where there are ample supplies of water, there is prosperity. Farmers in the arid regions need a reliable supply of irrigation water. Cities and towns require plenty of water for both domestic use and for industries. It takes efficiently managed watersheds to assure us this water supply. Human beings want to avoid damaging floods and at the same time be assured of steady supplies of water.

The Management of Watersheds

Our government agencies manage our watersheds so as to assure us of water. Efforts are made to protect them from fire, excessive timber cutting, careless logging practices, overgrazing, and other damaging uses. The soil and its protective covering are maintained. There is planned use of the soil and plant cover on a watershed. The croplands involve good farming methods designed to prevent erosion and waste of water. The non-farm lands are often the most important for water production. Wise management of these lands provide for the cutting of the timber and for logging by methods that will not adversely affect water yield by tearing up the forest floor and leaving places that will lend themselves to erosion. New timber crops are kept growing and worn out range areas are reseeded.

There is enough water for our nation's needs but it must be used wisely. We must do a better job of keeping our streams clean. Some towns and cities pollute clean streams by emptying sewage and waste water from industries back into the fresh water stream. This practice is not wise use of our water resources because it contaminates the fresh, clean water in the streams. Polluted water is a menace to both animals and man. Many communities in the United States need to clean up their water supplies, since pure water is not as abundant as it once was.

Man has learned how to build dams across our great rivers. These dams harness the power of the moving water and produce hydro-electric power. The recreational use of water is increasing. The domestic and industrial uses of water is increasing. If the American people are to have the water they need, our watersheds and streams must be used wisely.

FORESTS -- A Renewable Resource

The Importance of our Forests

Our forests are of great value to the American people. They serve us in literally thousands of ways. It would be impossible to mention all of these services, since wood and products of wood are continuously being expanded. Wood is a universal material and no one is qualified to accurately count its innumerable uses. However, let us consider a few of the things around us. Wood is used for shelter, for toys, for furniture, for newspapers, writing paper, books and many other paper products. It is used in making rayon, cellophane, and a myriad of other items which have played a part in making wood an indispensable material.

The forests have many other roles which give invaluable services to the citizens of our country. The part they play in our watersheds has already been discussed. They help prevent landslides, snow slides, and erosion. Large areas of the forests are used for livestock grazing and thus contribute to our nation's supply of meat, wool, and leather. Wildlife find their homes in the forests. There is an ever increasing use of the forests for various forms of recreation. The manufacture of wood provides full time employment to more than 1,300,000 Americans.

The living forest and the harvested forest have much to offer to the citizens of our land. The esthetic beauty, the atmosphere of peace, and relaxation are of great value. The forest is the friend of man and of the land. The use of the wood is of utmost value to our American economy. The goal of the Forest Service is to build our forests into continuous, rotating crops so that our descendents may enjoy the forests and benefit from its services as we do.

The trees of our forests have enemies that need to be controlled. Among the many enemies, fire is the most well known. Nine out of every ten fires are caused by human carelessness or indifferences. A great fire sweeping across the forest not only consumes trees that have taken many decades to grow, but also destroys the habitat of wildlife, kills much of the wildlife, and, sometimes, destroys homes or takes human life. Sometimes the fire burns primarily in the crowns of the trees. Other times it locates on the ground surface and destroys the litter on the ground, scorches the base of the big trees and opens wounds through which disease enters. Millions of dollars are spent each year to control forest fires. This money could be used in other areas if we could prevent the man-caused fires.

Insects cause enormous damage to our forests. They kill more trees than any other single enemy. The deadliest enemies of conifers are the bark beetles. These insects dig tunnels under the bark. This cuts the food "supply line" between the leaves and the roots, and, if the tunnels fully encircle the bark, the tree dies. Other destructive insects feed on the healthy stands of trees. Other destructive insects feed on the foliage of the tree. The Forest Service endeavors to maintain healthy stands of trees. This helps prevent the introduction of tree destroying insects. Infested trees may be removed or may be sprayed from the air with insecticides.

Diseases also attack the forest in many ways. Disease kills some trees outright and reduces the growth rate of others. Disease kills the heartwood in living trees, making them unfit for use. Research is being done to learn more about controlling the diseases that attack trees.

Animals grazing in the woods can do serious damage to both the mature and young trees. Domestic animals browse the young seedlings, particularly of the broad leaved varieties. Excessive numbers of deer kill young trees by browsing. Rabbits and porcupines kill forest trees by eating the inner back. In areas where the root system of the trees is shallow, wind and snow can do much damage.

Modern man is interested not only in the current uses of the forest, but also in the forests of the future. Continuous, rotating crops of trees are being assured by using both natural and artificial reforestation.

Natural reforestation is nature's way of spreading seeds by wind, birds, or animals and letting the small trees grow from these seeds. If all the parent trees are gone so there is no seed for the wind to carry, the only way a new forest can be started is from seed or small trees planted by man.

WILDLIFE -- A Renewable Resource

The management of wildlife resources is a challenging job. In order to be effective in wildlife management, we must understand and study nature's laws. These laws are fixed and unchangeable. It is folly to work against these natural laws. These laws are enforced by such basic factors as birth, death, and the needs of living things. Those who manage wildlife are concerned with the production of wildlife and the controlling of the excess of each annual crop.

It is a recognized fact that all life, wildlife included, must eat, drink, and find shelter in order to live. It must have a place to raise its off-spring. Only the wild creatures that find enough of the proper kind of food, cover, and water will live. Those who do not find these things must perish by starvation, being killed, or die off because they cannot reproduce themselves rapidly enough to replace their losses.

These natural laws are the foundations for one of the important principles of wildlife management. This principle is called "Carrying Capacity". Carrying capacity is the amount of wildlife which any piece of land can support or "carry" at one time. For example, let us imagine that an area of land could support one hundred deer. If the deer had fifty young, then this would be more than the land could support and some would die off, while others would be weakened and susceptible to disease. Hunting is a method of controlling the surplus and keeping the herd healthy.

Good wildlife management is based on fertile soil. Animals can be no healthier than the elements which are contained in the soil. Fertility of soil can be built up or conserved by the same methods which help the farmer improve his land.

The fact that carrying capacity can be increased wouldn't mean much if it were not for another natural law which is the ability of wild creatures to produce young in numbers far greater than needed to keep up the population level. However, an increase in the quality of food, cover, and water could allow more of this number to live.

Carrying capacity works in the winter season, too, through the same factors of food, cover, and water. These things grow harder to find as winter goes on and some of the animals die. There are always fewer animals by springtime than there were at the beginning of winter. For this reason, hunting is recommended so that balance may be maintained in the supply of animals. Hunting is a method of taking for useful purposes some of the animals that couldn't survive the winter anyway.

However, man is probably the greatest enemy of our wildlife. Industry and agriculture have destroyed much food and cover and excessive hunting has brought some species near extinction. This is why we have laws which allow hunting of some animals during restricted periods and limit the number that may be killed.

Everything man does changes the ability of land to support wildlife. Some activities may improve the area for wildlife. An example of this is logging that opens up sunlit patches so that food plants can grow. Other activities make areas less suitable for wildlife. An example of this is our expanding cities with more and more land being used for industrial development.

We can increase wildlife by helping nature increase the carrying capacity of the land. We must practice wise farming and forestry practices which will provide more and better food, cover, and water for wildlife. Game and fish managers have found that nature through her amazing power of reproduction can stock the new wildlife homes as fast as we can provide them.

FORAGE -- A Renewable Resource

A big part of national forest use, particularly in the western section of the United States, is the grazing of sheep and cattle. Grazing of domestic animals is one of the principal uses of 68 million of the National Forests' 181 million acres. In many places livestock graze on lands also used to produce crops of water, wood, and wildlife. The Forest Service manages the grazing lands of our National Forests very carefully. They must see that there will be sufficient forage, year after year, for the livestock and the big game which also use the range. They must see to it that enough grass and other forage plants are left over to protect the soil from erosion and to prevent excessive water runoff in watershed areas.

The forest rangers work very closely with the ranchers who depend on the government owned lands to graze their livestock. Local ranchers and farmers graze their animals on national-forest range under permit. They pay a fee for the livestock they graze and are given specific grazing areas. The animals are counted as they are put on the range because the number of animals and the length of time they may graze are carefully controlled. The rangers work closely with the stockmen to see to it that the land is kept in good condition.

Americans benefit from the variety of products that comes from the millions of cattle and sheep that graze on National Forests each year.

Wool for clothing, leather for shoes, and other products from these public forest rangelands help to sustain the livestock industry. The need for livestock products is increasing. The population is growing and this means the consumption of more meat. Better management of our forage will enable us to continue to meet the needs of American people.

RECREATION -- A Renewable Resource

Forest recreation has an irresistible appeal for Americans. The numbers of Americans turning to forests for relaxation, inspiration, and all other benefits of forest type recreation have multiplied many times in the last twenty years and is expected to increase even more. The forests are managed for the benefit of the American people. It is for the pleasure and convenience of the people that the Forest Service are endeavoring to provide facilities for recreation. They build public campgrounds and picnic areas. They provide winter sports areas. Good roads and marked trails are provided for the pleasure seeker. Experience has shown that most people prefer the carefully selected, improved areas which the Forest Ranger keeps safe and clean for their use. The recreation areas are kept maintained and in good repair. A clean water supply is essential and sanitation is always of prime consideration.

Many Americans are not as considerate as they should be when they use our forests. Some are careless and thoughtless. They leave litter and debris behind them. They destroy the vegetation that creates the beauty they have come to enjoy. A few even destroy or damage the facilities that have been provided. They don't seem to realize the damage they do to public property is actually destroying property that belongs to them. By leaving our camping area cleaner and better than it was when we found it, we can be of service to our nation.

For those rugged and adventurous forest users there are plenty of undeveloped wilderness regions to explore. Whether you go to the forest to picnic, swim, camp, fish, hike, hunt, ski, to enjoy wildlife, to seek a spiritual uplift, or simply to take a nap, the Forest Service is managing this great heritage to fill the inherent need of Americans to love and be close to the land.

TERMINOLOGY

Aesthetic Values - Refers to the enjoyment received and the values gained from being able to see and appreciate something in its natural state.

Algae - - - - Simple plants that grow in water and on rocks.

Annual Rings - Each ring or circle on a cross section of a log represents a year's growth.

Artificial Reforestation - The planting of trees on burned or cutover land by men.

Bacteria - - - One celled organisms which are too small to be seen with the naked eye.

Browse - - - - Nibbling at tender shoots of shrubs and trees, e.g. Deer browse on shrubs and trees instead of grazing grass.

Cambium - - - A part of a tree. It is the thin microscopic layer of cells which adds new wood and bark to a tree.

Carrying Capacity - The greatest number of animals an area can carry as determined by the amount of food available.

Conglomerate - A rock whose name means "something mixed together". It is made up of clay, sand, and pebbles cemented together.

Conifer - - - A cone bearing tree like pines and firs.

Conservation - The protection and wise use of our natural resources so they can be used and enjoyed by the greatest number of people.

Cruising Radius - Distance from the center to the outer edge of a circle covering the entire movements of an animal. This may be a matter of yards for a field mouse or over a hundred miles for a mountain lion.

Deciduous - - Is the name for any tree which loses its leaves at a certain time of the year and later grows new leaves. In northern temperate regions, most deciduous trees lose their leaves in the autumn.

Ecology - - - The science which is concerned with plants and animals in their relation to each other and in their relation to their environment.

Erosion - - - The wearing away of earth or rock by the action of air, water, and changes of temperature

Estivation - - A state of sleep which some animals enter during the summer months.

Fault - - - - The shifting or movement of earth causing rocks to break or crack so that pieces slide in different directions.

Forage - - - - That part of the vegetation available for planned use by livestock and wildlife.

Fungi - - - - The name of a group of simple plants that have no green coloring matter. They have no stems, leaves, or flowers.

Grazing Capacity - Maximum number of livestock a given unit of land will support during the regular grazing period without doing damage to the soil, plants, watershed, wildlife habitat, or tree growth.

Ground Cover - The growth of grasses, shrubs, and other plant life, as well as fallen leaves, twigs, etc. which help hold the soil in place.

Habitat - - - is the place in which a plant or animal usually lives in nature. It is an animal's home territory and, therefore, must include escape cover, winter cover, food and water, cover to rear young, and even cover to play.

Heartwood - - The hard central wood in the trunk of a tree. The heartwood is actually dead wood. Its purpose is to support and provide strength for the tree.

Hibernation - The act of spending the cold weather in a torpid or sleeping condition.

Humus - - - - The partically decayed remains of plants and animals in the soil.

Hydroelectric - The generating and distributing of electric energy derived from the energy of falling water.

Igneous Rock - Rock which has been produced under intense heat. Igneous rocks are rocks that have been either magma or molten lava.

Inner Bark - - The thin layer of bark located on the underside of the outer bark. The inner bark carried prepared food from the leaves to the growing parts of the tree.

Lichen - - - - A flowerless plant that grows on bare rocks and tree stumps and in waste places throughout the world. Each lichen consists of an alga and a fungus that live together in a kind of plant partnership.

Multiple Use - Use of land for more than one purpose.

Metamorphic Rock - Rock that has been changed into a new form by heat, pressure, and steam.

Natural Reforestation - Trees reproducing themselves by means of seeds falling to earth, taking root, and thus producing young trees.

Overgrazing - Allowing livestock or wildlife to feed on an area of land until it damages the soil, plants, watershed, or tree growth.

Predator - - - An animal which lives by preying on weaker animals.

Rotation Age - The average normal period of years required to grow an even aged crop of trees.

Sedimentary Rock - Rock which has been formed from sediment made up of sand, pebbles, and mud.

Topsoil - - - The productive top-layer of soil on the surface of the earth.

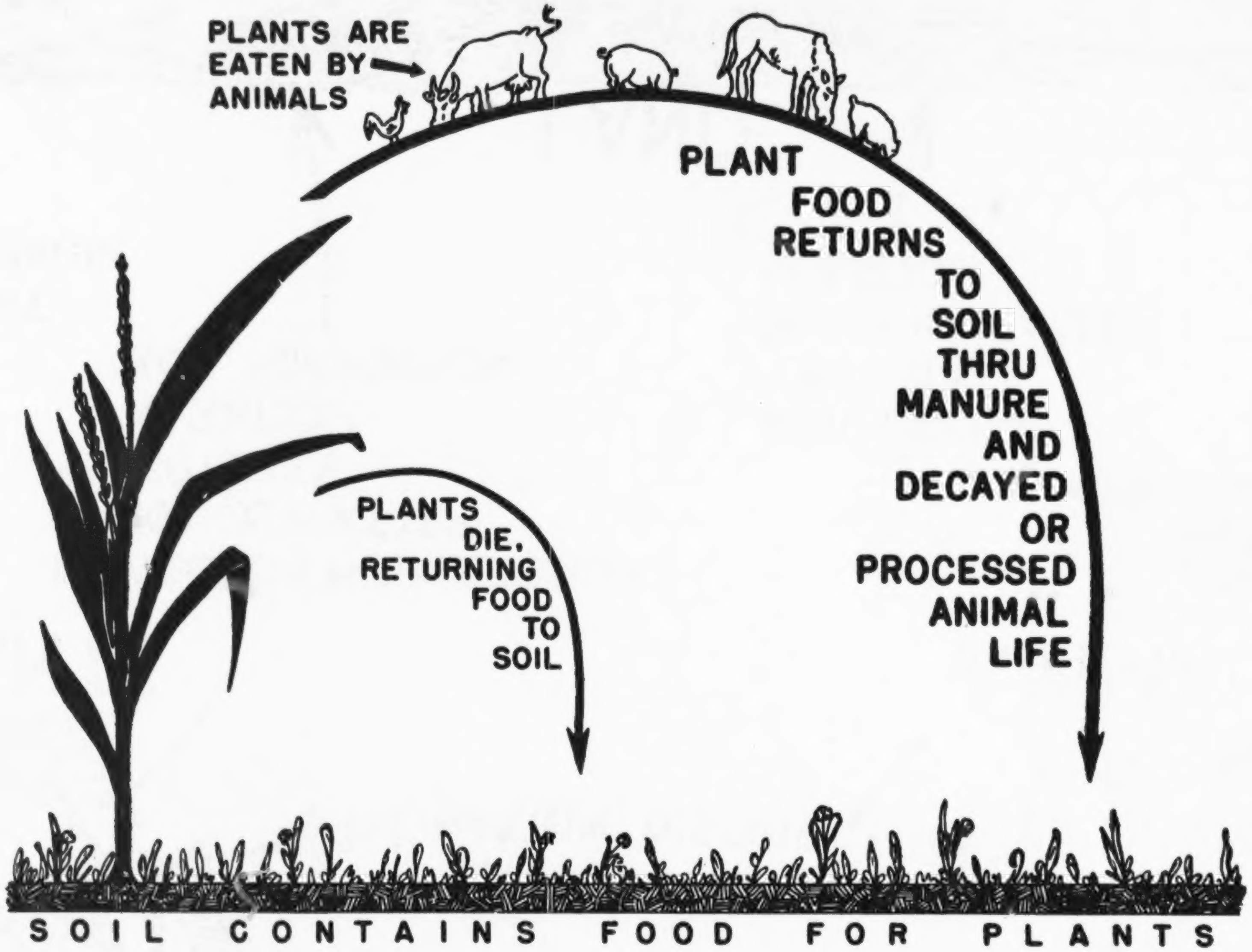
Watershed - - An area of land from which a stream gets its supply of water.

Water Table - The underground water which has soaked downward to a zone where the rocks are saturated with water. The top level of this saturated zone is the watertable.

PRE OUTDOOR ACTIVITIES AT SCHOOL

Concepts to be Developed	Activities
Plants and animals live in an environment or habitat to which they are adapted.	Study the nature trails at the Outdoor Education School given in the guide and select a committee to assist in directing such pre-school class projects as - Selecting, reading and reporting on reference materials. Examining and discussing films, study prints and materials on fungi. Select related music for listening and singing. Reading aloud or narrating related literature-type prose or poetry. Beginning a classified vocabulary list which might be made into a nature dictionary; word, definition or description, picture. (Could include birds, other animals, trees, and plants.)
	List the animals and plants mentioned in the guide. Read about, discuss, and examine any samples and pictures of them.
Soil, water, forests, and wildlife are natural resources, all dependent upon one another.	Review information and study new materials about the interdependence of plants and animals.
	Read about and discuss the interdependence of soil, water, and plant life.
Soil is a mixture of fragmented, weathered rock, organic matter, bacteria, water, and air in varying proportions. Time is an important factor in soil formation.	Review previously learned facts and study new materials concerning the formation of soil. Observe such evidences of soil formation as crumbling rocks and decaying leaves as possible. Even note the lawn clipping after several days.
	If possible take a short trial run or plan an imaginary one. This might result in several discussions such as - What rules to follow. What to look for. How (or whether) to collect, identify, and mount samples. What materials will be needed. Who is to do what on the trail; after the trail.

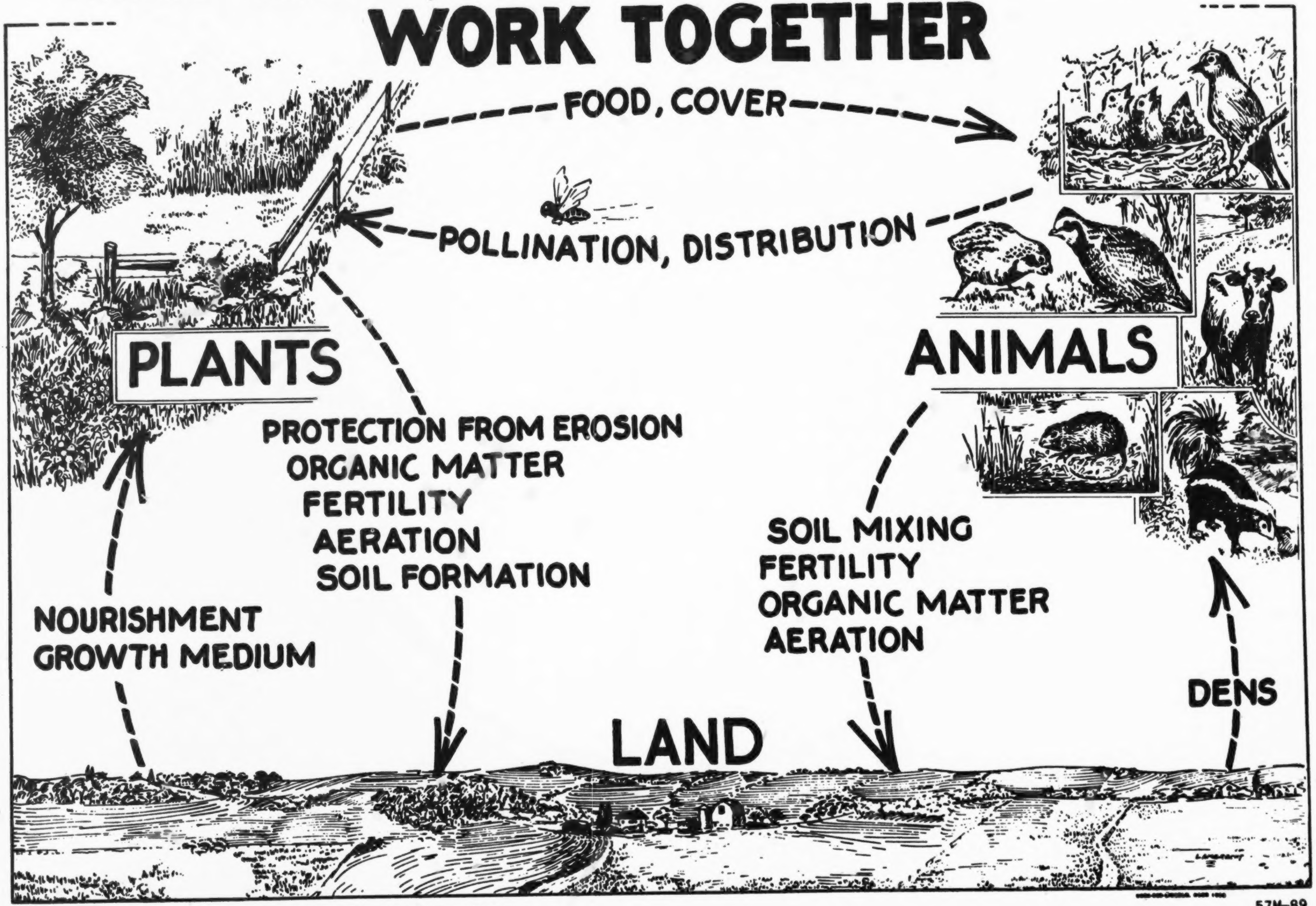
Concepts to be Developed	Activities
Erosion is an enemy of one of the most important natural resources; erosion wears away the soil.	Try to find places where soil erosion has taken place. Discuss how it was identified as erosion.
Rocks are of three basic kinds; igneous, sedimentary, and metamorphic.	Study carefully the rocks included in the rock kit. Become familiar with the description. All of these rocks are found in Jefferson County and many are found at the Outdoor Education School site.
There are many different kinds of plants; they have special characteristics.	Observe and identify trees, weeds, and wildflowers in the home neighborhood or in other places in the community. Collect, identify, and mount leaf and specimens.
There are different kinds of animals; each has a special characteristic.	Review the trails given in the guide and list the animals to be found at the Laboratory School. Study about them to be able to identify them when the group visit the school.
	If records are available for bird calls listen to them and try to identify them when heard at the school.
It is important that all people in a democracy accept responsibility for the preservation of natural and human resources.	Plan and prepare an original skit based on outdoor good or bad manners and practices, including such aspects as safety, vandalism, littering, conservation.


PLANTS ARE
EATEN BY
ANIMALS
PLANT
FOOD
RETURNS
TO
SOIL
THRU
MANURE
AND
DECAYED
OR
PROCESSED
ANIMAL
LIFE
PLANTS
DIE,
RETURNING
FOOD
TO
SOIL
SOIL CONTAINS FOOD FOR PLANTS

THE NATURAL CYCLE

USDA-SCS LINCOLN, NEBR. [illegible]

HOW LAND, PLANTS AND ANIMALS WORK TOGETHER



FOOD, COVER

POLLINATION, DISTRIBUTION

PLANTS

ANIMALS

PROTECTION FROM EROSION
ORGANIC MATTER
FERTILITY
AERATION
SOIL FORMATION

SOIL MIXING
FERTILITY
ORGANIC MATTER
AERATION

NOURISHMENT
GROWTH MEDIUM

DENS

LAND

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

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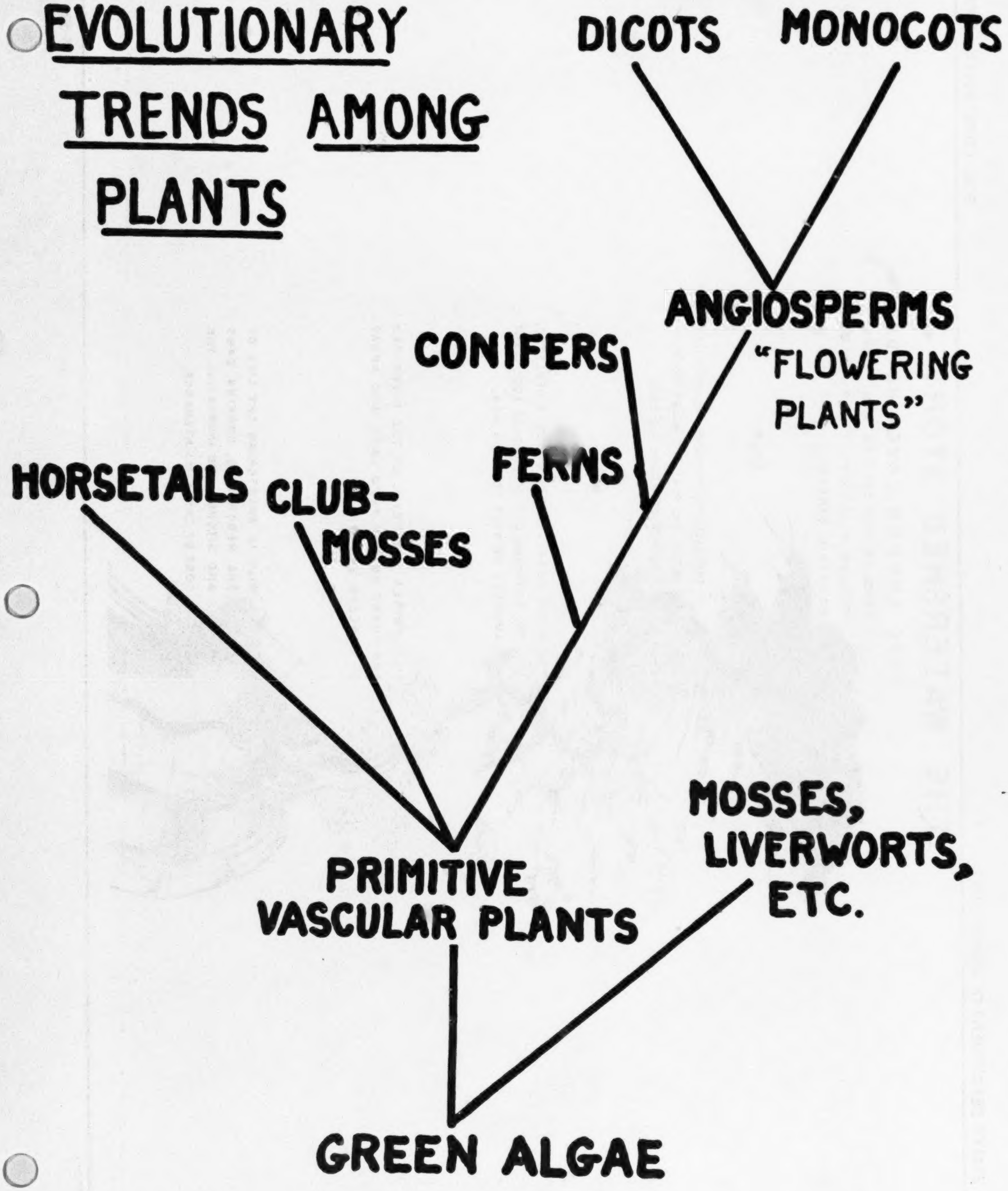
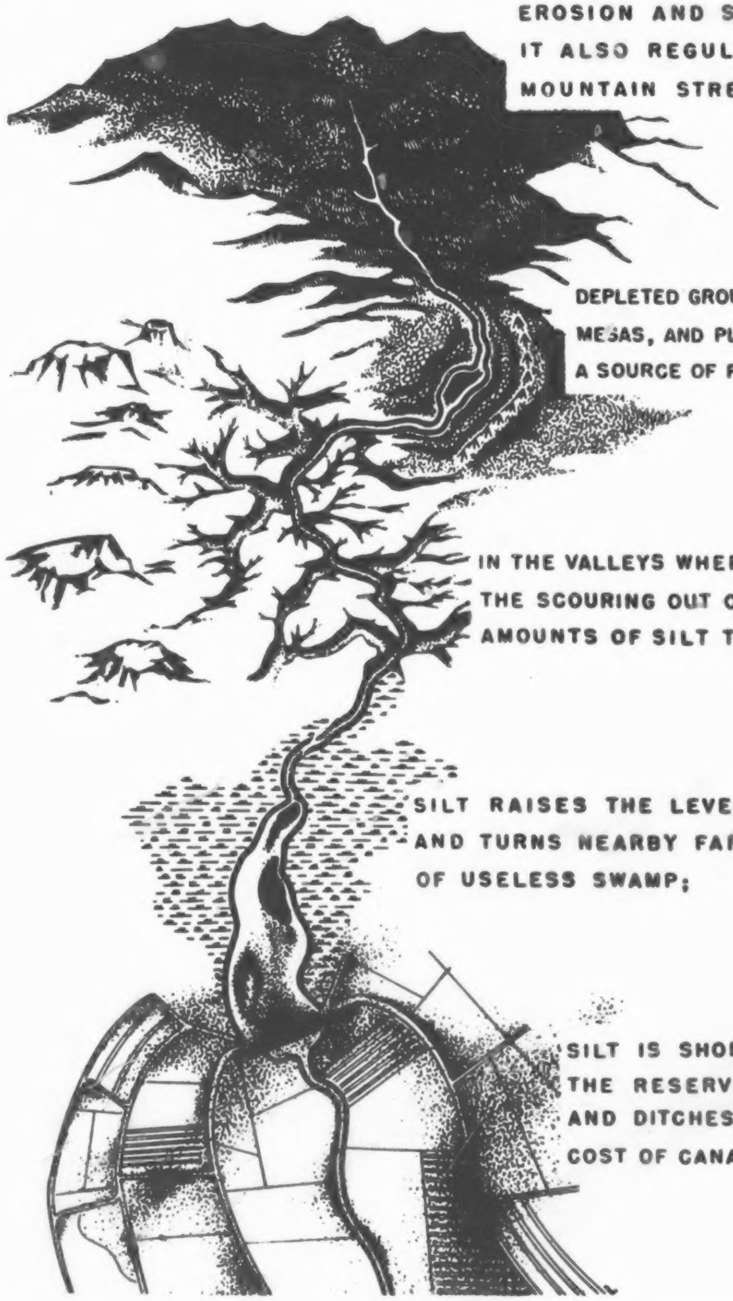
EVOLUTIONARY TRENDS AMONG PLANTS



DICOTS
MONOCOTS
ANGIOSPERMS
"FLOWERING PLANTS"
CONIFERS
FERNS
HORSETAILS
CLUB-MOSSES
PRIMITIVE VASCULAR PLANTS
MOSSES, LIVERWORTS, ETC.
GREEN ALGAE

THE WATERSHED STORY



GOOD GROUND COVER HOLDS EROSION AND SILT TO A MINIMUM; IT ALSO REGULATES THE FLOW OF MOUNTAIN STREAMS,

but

DEPLETED GROUND COVER ON FOOTHILLS, MESAS, AND PLATEAUS MAKES THE RIVER A SOURCE OF FLOODS AND SILT.

IN THE VALLEYS WHERE GRASS IS DEPLETED, THE SCOURING OUT OF ARROYOS ADDS VAST AMOUNTS OF SILT TO THE RIVER;

SILT RAISES THE LEVEL OF THE RIVER BED AND TURNS NEARBY FARM LAND INTO AREAS OF USELESS SWAMP;

SILT IS SHORTENING THE LIFE OF THE RESERVOIRS, CHOKING DAMS AND DITCHES, AND INCREASING THE COST OF CANAL MAINTENANCE.

[illegible]

SUGGESTED DAILY SCHEDULE

Monday

8:45 - 9:15	Health check by school nurse. Leave school.
10:00 - 10:30	Visit Red Rocks Park.
11:30	Arrive at Outdoor Education School.
11:30 - 12:00	Wash for lunch.
12:00 - 12:30	Lunch. Announcements
12:30 - 1:00	Unpack and to dorms.
1:00 - 1:30	Orientation to school by Outdoor Education School Principal.
1:30 - 1:45	Flag ceremony and check in medicine to nurse.
1:45 - 4:30	Core Program - Directed Activities.
4:30 - 5:00	Planned activity.
5:00 - 5:15	Wash and prepare for dinner.
5:15 - 5:30	Table hoppers report to cafeteria, others to flag ceremony.
5:30 - 6:00	Dinner
6:00 - 6:30	Playground - one teacher supervising.
6:30 - 7:00	Planned activity or begin evening program.
7:00 - 8:30	Evening program - related activities.
8:30 - 9:00	Medication and prepare for bed.
9:00	Lights out.

Revised 1/65

Tuesday, Wednesday, and Thursday

7:00 - 7:45	Rise. Dress. Make beds. Cabin inspection.
7:45 - 8:00	Table hoppers report to cafeteria, others to flag ceremony.
8:00 - 8:30	Breakfast
8:30 - 8:45	Medication and prepare for morning activities.
8:45 - 11:30	Core Program (directed activities)
11:30 - 12:00	Wash, rest, prepare for lunch.
11:45	Hoppers report to cafeteria.
12:00 - 12:30	Lunch. Announcements (Wednesday, choice of sack lunch or cookout)
12:30 - 1:00	Planned activity - one teacher supervising.
1:00 - 1:30	Prepare for afternoon activities.
1:30 - 4:30	Core program
4:30 - 5:00	Teacher-class evaluation. (Keeping log, writing letters.) Related activities.
5:00 - 5:15	Rest. Wash and prepare for dinner.
5:15 - 5:30	Flag ceremony and table hoppers report to cafeteria.
5:30 - 6:00	Dinner.
6:00 - 6:30	Playground - one teacher supervising.
6:30 - 7:00	Planned activit~~y or b~~egin evening program.
7:00 - 8:30	Evening program - related activities.
8:30 - 9:00	Medication and prepare for bed.
9:00	Lights out.

Friday

7:00 - 7:45	Rise. Dress. Pack gear and take gear to parking area.
7:45 - 8:00	Flag ceremony and table hoppers report to cafeteria.
8:00 - 8:30	Breakfast
8:30 - 9:00	Health check by nurse.
9:00 - 11:00	Culminating activities (hike, scavenger hunt in upper meadow, etc.)
11:00 - 11:15	Evaluation - principal of Outdoor Education School.
11:15 - 11:30	Table hoppers report to cafeteria, others to Flag ceremony.
11:30 - 12:00	Lunch
12:00 - 12:30	Load gear on bus. Leave for home school.
2:00	Arrive back at home school

PART III

The Trails

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HOW TO LEAD A FIELD TRIP

A portion of your work at the Outdoor Laboratory School will be accompanying students on nature hikes or field trips. Your success depends on two factors: your nature knowledge and your leadership ability. Here are some suggestions that will stimulate enjoyment of such excursions for both you and your students.

Before the Trip

Know the area and route it thoroughly. It is virtually impossible to do a first class job of nature guiding without at least one preview trip. You must know the lay of the land, work out a sequence of events or experiences, and consider the mechanics of moving the group from place to place. Keep in mind the direction of the sun; note slippery or difficult spots along the trail; find places large enough for the group to assemble where you can explain interesting features. Don't feel that you have to know everything. However, it is wise to inform yourself by a bit of extra study. Decide what, if any, printed information should be distributed.

SUMMARY:
1. Familiarize yourself with the route to be followed.
2. Take an inventory of objects, features, views, and experiences.
3. Assemble facts, materials, and pertinent stories or other human interest material.
4. Organize the series of planned stops for observation and talks around a significant theme.

Conducting the Trip

1. Be at the starting point ahead of time. This is the time to set the atmosphere. Comment on binoculars, weather, footgear. Be friendly and establish good relations with your students. Demand their respect.

2. Begin on time. Have the group agree that you are the leader and that you will go first at all times. Establish rules of discipline. Give any special information which may be necessary for the group's safety or enjoyment of the trip. Much of this can be done in a tactful and slightly amusing way.

3. Start off briskly. It is best to walk fast until the party sets a good pace, then slow down as you approach your first observation point.

4. Make sure everyone sees"the object of interest". Speak in a voice that can be heard. It may be wise to move back to the center of the line during the observation period.

5. Encourage participation. Ask the group to be on the lookout for signs of the "topic of study".

6. Interpret what you see. An example: "When the storm blew down these big trees, it punched a hole in the roof of the forest, letting in the sunlight. That's what these bushes needed to grow. New birds and animals quickly occupied this newly formed habitat."

7. Help the students improve their powers of observation. Be alert. Draw attention to a plant or a bird or animal by describing characteristics before you name it.

8. Be Enthusiastic. Your success as a nature leader depends on this ability to communicate to your students the excitement of discovery and enjoyment of nature.

9. Keep the group together. Effective control in moving your group from stop to stop has a lot to do with the trip's success. It is a good practice to reverse the line occasionally. One way is to turn off on a side trail until the last person has left the main trail. Then with an "about face" the reoriented group will be ready to swing back on to the trail. Encourage those in the back to watch for things you have missed.

10. Treat your stops like the episode in a serial story. Continually develop your basic theme and introduce the next experience when possible. Sometimes you can manage drama and control at the same time by announcing something exciting to be seen at the next stop.

11. Make use of rest periods. Exhibit specimens picked up along the trail. In a casual manner solicit discussion of the basic theme you have been unfolding.

12. Conclusion of trip: as a rule it is wise to plan fewer stops after passing the half way mark; give some summary highlights and encourage questions.

ON THE WAY

The study of Geology has great interest appeal for all elementary children. Excellent study materials are available on the way to the Outdoor Education Laboratory School. The following materials are available to the individual classroom to help prepare for the trip:

a. Rock and Mineral Kit made up of samples from Jefferson County
b. Colored slides of geologic features from the Front Range to the Laboratory School

In order to get the greatest benefit from the trip, one should plan to go via Alameda Avenue, entering Alameda no further west than Simms Street.

Point Number One

Table Mountain, located near Golden, can be seen from this route. The hard cap of basalt rock covers and protects this table mountain from erosion.

Point Number Two

Green Mountain has also been formed by erosion and is made from the same material as Table Mountain. However, Green Mountain is not protected by a hard basalt cap. Gravel, boulders, and conglomerate are found on top of this mountain. At one time, the surrounding area was the same level as this mountain. Since that time, these areas have eroded away at a faster rate.

Clay for Denver brick factories is still being mined from the west slope of Green Mountain. For many years, coal was mined from under this mountain. Petrified wood can also be found in this area.

Point Number Three

After crossing Green Mountain, a ranch can be seen at the foot of the Hogback. The Rooney's were some of the first settlers in this part of the country. Indians, traders, covered wagons, and famous people like Buffalo Bill were some of the early visitors to this ranch. Many excellent arrowheads can be found on this ranch.

Point Number Four

Just west of Rooney's Ranch is the Benton formation. This formation is made from dark colored shales. Bentonite and selenite can be found in this formation. Bentonite swells when it gets wet. Can you imagine why it is dangerous to build roads or building on this mineral? Fragments of oyster shells and fossil shark teeth have been found in this area.

As you travel along the slope of the hogback, notice the ripple marks and the wave marks in the sandstone. Every sedimentary rock tells us a story. These marks and dinosaur tracks found on this sandstone tell us that dinosaurs lived near water.

The ridge of the hogback is made from hard Dakota sandstone which erodes away more slowly than the surrounding rock. This formation is of high economic value because of the oil, gas, and water that are found in the sandstones. Notice the layers of shale separating the sandstones. The shales act as reservoirs, holding the oil and water. Fire clay and coal have also been mined from this formation.

The Morrison formation can be seen halfway down the west slope of the Hogback. This formation received its name because it was first described in the Morrison area. In 1877, a complete dinosaur was dug from this formation. It took seven railroad flatcars to carry it to the Museum of Natural History in New York City.

Point Number Five

The wide, low valley at the entrance to Red Rocks Park is mostly the Ralston formation. The sandstones, siltstones, and shales of this formation were softer than the surrounding area and therefore eroded more easily, forming a valley.

Point Number Six

The oldest sedimentary rocks in this area are the Red Rocks or Fountain formation. Sandstones, arkose (a coarse sandstone), shales, and conglomerates make up the sedimentary rocks in this formation. The red color of these rocks is due to a film of iron coating on the sand and shale grains.

The Red Rocks were once flat-lying with one formation resting upon another, similar to a layer cake. During ancient mountain building activity, these rocks were pushed up and tilted toward the Front Range. Being soft rocks, they broke in many places during this process. These breaks are called "faults". The Fountain formation was once buried underneath other formations a mile deep. Since that time the formations covering the Red Rocks have eroded away.

Point Number Seven

Geology Interest Point is located on a gravel road north of the amphitheater. This gives one a diagram of the front range of the Rocky Mountains.

Point Number Eight

Just west of the Red Rocks amphitheater are located some of the oldest metamorphic rocks in the world. Between the sedimentary Fountain formation and the metamorphic rocks is a great gap in time.

Point Number Nine

As you go through the city of Morrison, notice how Bear Creek has cut a gap in the Dakota hogback. This stream has been making the canyon deeper and wider for many millions of years.

Point Number Ten

During the trip through Bear Creek Canyon, discuss with the students the story of the Front Range.

The Front Range - We like to think that the surface of the earth is strong and stable. But during the earth's past, its crust has been warped, tilted, uplifted, or depressed. We have gone through the top mile or so of the earth's sedimentary rocks. Now we are going deeper below the sediments into the metamorphic rocks, which make up the Front Range. These were once sedimentary rocks, also, but during the Laramide Revolution these were under such pressure and heat that they changed into the hard rocks we see as we look out the windows. All these changes are called "diastrophism."

The uplift of the land from oceans to highlands we have seen as we passed through the Red Rocks area and discussed the fossils found in many formations.

Going up the canyons, we see beds of rock folded one above the other like cards in a bent pack. At one place the beds had been six miles wide before folding, but only four miles wide after folding.

The rocks and the mountains we are looking at are not the first in this area. The geologists tell us there were two different periods of mountain building in Colorado. These mountains are over one billion years old. Yet the sedimentary formations in the Red Rock area came from mountains older than these.

There were at least 10,000 feet of sediments over these mountains before they started to grow. What has happened to them? They have been deposited at the mouth of the Mississippi.

Imagine the heat generated when these mountains began to grow! The schists seen along the canyon walls were originally shales. There was so much heat and pressure that you cannot find any slate. The quartzites were originally sandstones. The heat fused the sand crystals together so the quartzite breaks right through the grains. The reddish color in the rocks comes from hematite (iron). The purplish color comes from manganese.

These Paleozoic rocks are exposed only where they have been raised by mountain uplifts and the sediments on top of them were worn away by erosion. Thus, they outcrop mainly along the flanks of the mountain ranges. They are usually buried beneath younger sediments. Many of the rocks in the canyons look like they have been cut in square shapes. This is called "joints." These are the rsult of great stress. Joints are fractures. A block of granite under compression develops a system of joints nearly at right angles to each other.

NATURE TRAILS

The two nature trails included in the guide are an integral part of the Outdoor Education experience. Only as the children follow the trail are they able to see many of the things they studied when they were getting ready to spend some time at the Outdoor Education Laboratory School. It is here understandings will be strengthened. It is here, in this natural setting, appreciation, awareness, and love of nature can be fostered. Surely, in an environment such as this, every child will develop an awareness of the importance of conserving our natural resources.

The Nature Trails have been planned with the core program in mind. Each marked observation stop along the trail points out several facts related to this main field of study.

Prior to the scheduled time of the hike, the children should be given a copy of the trail and should become familiar with the information. The guide and teacher should be familiar with the trail and have planned the method of presentation before starting the hike.

Following are the main facts concerning each indicated observation stop on the trails. Other related facts or further evidence of facts already mentioned may be noted as one proceeds along the trail.

ACTIVITIES AT THE SITE

Concepts to be Developed

Note to Teachers:
Prior to the hike, organize the class into trail groups and issue such instructions and materials as are needed.

Recall and discuss the plans made at school and make any additional ones necessary to clarify procedures.

Plan to observe, discuss, make notes, and collect specimens to compare with mounted samples on exhibit at the outdoor school. Remind the pupils that only certain one are delegated to collect specimens. (This is an opportunity to teach conservation as many children wish to get specimens of everything they see and are not in a position to do anything with them.) Stress necessary precautions.

Try to have the pupils become familiar with the trees they see along the trail and be able to know their general classification and some reason why they live there.

GUIDE QUESTIONS WHICH MIGHT BE USED AT each marked point on the trail include:
- What is it?
- Why is it there?
- What is involved?
- How was it formed?
- From where does it come?
- What is happening?
- How is it used?

All living things -- man, animals, plants, and the soil that supports them, are interdependent and interrelated with each other. Man is a part of this complex fabric and must adjust and control to promote those relationships that will benefit not only himself but posterity as well.

Observe a bird nest and its immediate environment. Note materials used in construction - twigs, grasses, lichen for camouflage, etc. Discover some relationships between the nest and and other forms of life.

Concepts to be developed:

Native plants and animal life in any area contribute in some way to the benefit of other forms present or may serve as a control to keep them in balance.

Animals live in an environment or habitat to which they are adapted.

There are different kinds of animals and each has special characteristics.

Human beings and other animals produce and receive sounds.

Adaptation of plants occur because of physical factors, such as climate, soil, and water; because of competition with other living things, and because of selective breeding.

Erosion is an enemy of one of the most important natural resources; erosion wears away soil.

Soil, water, forest, and wildlife are natural resources; all depend on one another.

Notes to teachers:

Observe and study rocks, logs, or tree bark which serve as: a home or shelter for an ant colony; a shelter from heat; protection from predators.

Observe how food larve or termites reduce the log to humus.

Teacher should suggest to the pupils the necessity for extreme care when running over rocks and logs.

Observe and discuss evidence of the use of trees made by animal life. Discuss the cycle of interdependence of plants and animals.

Observe and identify animals seen on the trail or at the school site.

Observe and identify animal tracks or other evidences of the existence of animal life.

Observe ways in which plants adapt themselves to their environment.
Note such things as -
  The effect of light on plants.
  Plant growth on steep slopes.
  Plant growth on hot dry slopes.
  Luxuriant growth in cool, moist shade.
  Lichen growth on barren rock.
  Fungi growth.

Observe various plant groups that typically are found associated together. Discuss the factors that are responsible for their occuring together, such as -
  Type of soil and drainage conditions.
  Moisture conditions throughout the year.
  Temperature conditions.
  Type of exposure: hot, dry, cool, moist, etc.
  Life distribution and elevations.

Observe evidences of different kinds of soil erosion: wind, water, (gully and sheet) and man-made.

Look for places where vegetative cover prevents soil waste from water or wind erosion. Compare with an uncovered place which has been the victim of erosion.

Concepts to be developed:

There are different kinds of trees and plants. They have common needs but also have definite characteristics.

Notes to teachers:

Observe different kinds of trees and plants; notice interesting characteristics. Answer such questions as -

- What is a tree?
- What is an evergreen tree?
- What is a deciduous tree?
- What kinds of trees were observed?
- What is a life zone indicator?
- What kinds of seeds are produced by trees native to the region?
- What kinds of seed dispersal are represented?

Observe, identify, and collect samples of leaves and seed specimens of such other plants as are found on the trail.

Notice the foliage of the trees (photosynthesis).

Identify some other plants growing in the shaded areas.

Notice the texture of -
Fire damaged living trees
Young trees
Old trees
Burned stumps
Marsh plants
Mosses
Lichens
Ferns
Other plants

The beauty and esthetic value of the natural environment is in itself an important resource which must be cherished and guarded.

There are many facets of nature which compose the esthetic beauty of our forest lands. Different people may see and enjoy different things in scenery. Students should be encouraged to develop an awareness of the esthetic value of these regions.

Notice how the sunlight breaks through the foliage and creates shafts of light. How does this reflected light change the color tones of earth, plants, and animals. Discuss how this light plays an important part in what grows underneath this "ceiling" of foliage.

Observe various geometric shapes in the trees, shrubs, and plants in the area. Try to locate and point out to the rest of the group objects which appear to be triangular, cone-shaped, round, curved, square, box-like, rectangular, or cylindrical.

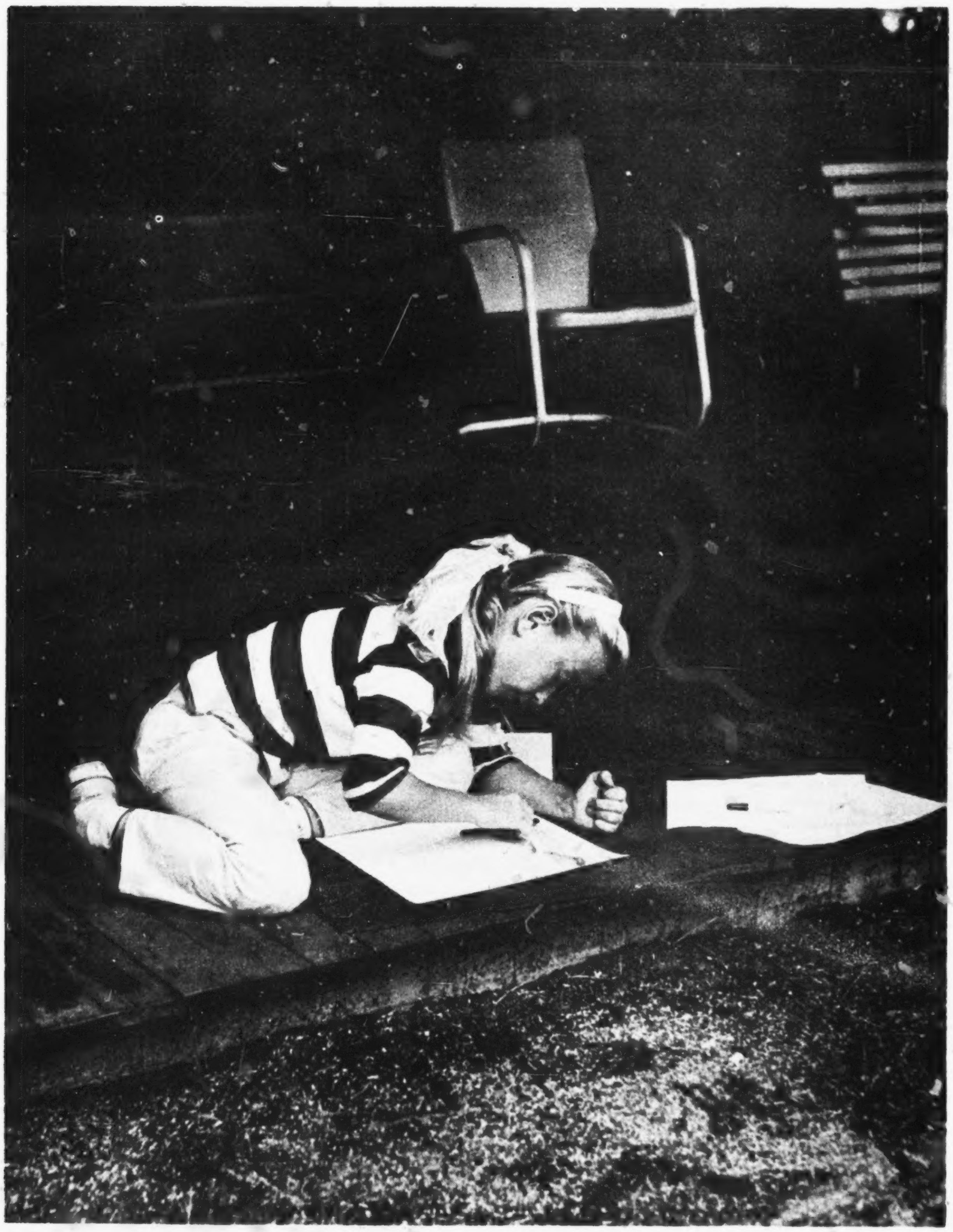
Concepts to be developed:

Plants supply food and oxygen to animals; animals supply carbon dioxide and fertilization to the plants.

Notes to teachers:

Observe -

The natural collection of humas material.
Decaying bodies.
Bark animals use for food.
The strongest survive and the weaker become a part of the soil.



PUTTING INSPIRATION ON PAPER

Concepts to be developed:	Notes to teachers:
Some natural resources are renewable. Wildlife, forests, and other plants are examples of resources that can be renewed.	Note any renewal of natural resources.
As a stream slows down, it drops its sediments to form a fertile delta.	Observe evidences of the formation of deltas. Discuss the relationship between erosion and soil renewal.
Fire protection in the mountains is a very important part of conservation.	Note evidences of forest fires; discuss means and importance of prevention.
Rocks are of three basic kinds: igneous, sedimentary, and metamorphic. There are different types of soil: each has certain characteristics.	Observe, identify, and collect specimens of rocks to contrast and compare with rock samples from other places.
Soil is a mixture of fragmented weathered rock, organic matter, bacteria, water, and air in varying proportions.	Observe such examples of soil building as - Lichens slowly breaking down the rock surfaces through the acids they produce. Fungus and similar types of growth, under moist conditions, causing wood and bark to decay. Insects at work reducing wood fiber to humus. Other types of decaying vegetation forming and depositing soil. Decaying animal matter enriching the soil. Wind, water, and man wearing away or crumbling rocks to form soil. Teachers should encourage children to examine the decaying plants and crumbling rocks that are making soil. Use a hand lens. Test soil for color, mulch, texture composition.
Fertile soil provides materials for plant growth. Water dissolves minerals in the soil which green plants can use for food.	Observe and discuss the relationship between the - Moisture and temperature. Ground cover and the growth cycle. Small trees and the larger trees. Use of water and the laws and regulations.

The Mountaineer Trail - - Plan about 2 hours for this hike.

This nature trail starts between the Commons and Dormitory #2. It winds up and over the hill in back of the Commons, coming back on the east side.

Point Number One

The first stopping place is located approximately 75 yards northwest of the Commons at the base of an old stump. Looking directly west we see Mt. Evans which is one of Colorado's 53 peaks over 14,000 feet in elevation.

The large stump on the right of stake number one is probably the remains of a large conifer. The wood of this old stump is rotting. It is being destroyed by millions of bacteria and fungi. Bacteria and fungi are very important when it comes to keeping the world from being covered with dead animals and plants. These organisms are decomposing this old stump and sending it back into the soil. On the bark there is a lichen growing which is called "Old Man's Beard". On some of the rocks around the stump, we can see samples of other lichens. A lichen is composed of two different kinds of organisms or forms of life. These two different forms which compose the lichen are actually widely separated in the plant kingdom. One is the fungus part and the other is green algae. The green algae can take in simple food from carbon dioxide and water with the help of sunshine (photosynthesis), which the fungus can't do. The fungus, however, protects the algae from drying, from too much heat, and from being blown away. The relationship of these two plants is called "symbiosis". This is the association of two organisms under which each contribute something to the other so that both of them can survive.

A little to the right of the stake is a Mountain Maple. On the rock by the maple, there are not only many varieties of lichens, but also mosses. Lichens and mosses are contributing factors in the decomposition of rocks. The lichen is the first organism able to survive on rock material. It gives off enzymes (a weak acid) which tend to dissolve the rock. The rain will wash off this dissolved material and we will have some soil formed. There will also be soil in the cracks of the rocks and once the cracks become large enough, the mosses and other plants can take over.

Around us are Ponderosa Pines which are a two or three needle pine. The needles are quite long. Near the stump is a young spruce tree. The needles are relatively sharp. To our right is a Douglas Fir. In Colorado the needles are flat. Remember the word flat begins with "f" and the word fir begins with "f" also.

The rocks about us are Metamorphic. That means they are rocks which have been made over. They have changed form and appearance. The rocks in this area have been metamorphosed or changed by heat and steam or by the pressure of folding. Folding bends and squeezes rocks under tremendous pressure. Much of the rock around us is gneiss (pronounced nice). This is a coarse-grained rock which contains quartz, feldspar, mica, and other minerals. Most granite gneiss still resembles granite. There is also some Schist around us. Schist is a metamorphic rock made from clay, shale, sandstone, and other materials. This type of rock has been squeezed under much pressure. In the schist rock, there are flakes arranged in sheets known as folia. Generally folia can be split apart quite easily. Their shiny flakes and the way they cut across show that they are not thin layers of sediment. Looking towards the northwest, midway up the opposite hill is a fault zone. This is an area where rock was broken when the land moved upward or downward. When the earth pushed up, the rocks cracked and one area is much higher than the other.

Looking out toward Mount Evans is a meadow with a stream running through it. This is typical of the winter home of the mule deer. During the summer time, the deer will inhabit the country close to us and just as high as possible. They will even go above timber line. In the winter they are driven down into lower, protected areas such as this one. This is a very crucial period for the deer's life. They must find adequate food in order to live. As we continue up the trail, we will see bitter brush, Mountain Mahogany, and young aspen shoots, all of which serve as food for the deer. Contrary to what people think, the deer eat these browse plants rather than the green grass. The currant bush immediately west of the stump is also a fine deer food.

In this terrain, we will find snowshoe rabbits, blue grouse, mule deer, black bear, porcupines, mountain lions, many species of squirrels and ground squirrels, coyotes, and the red fox.

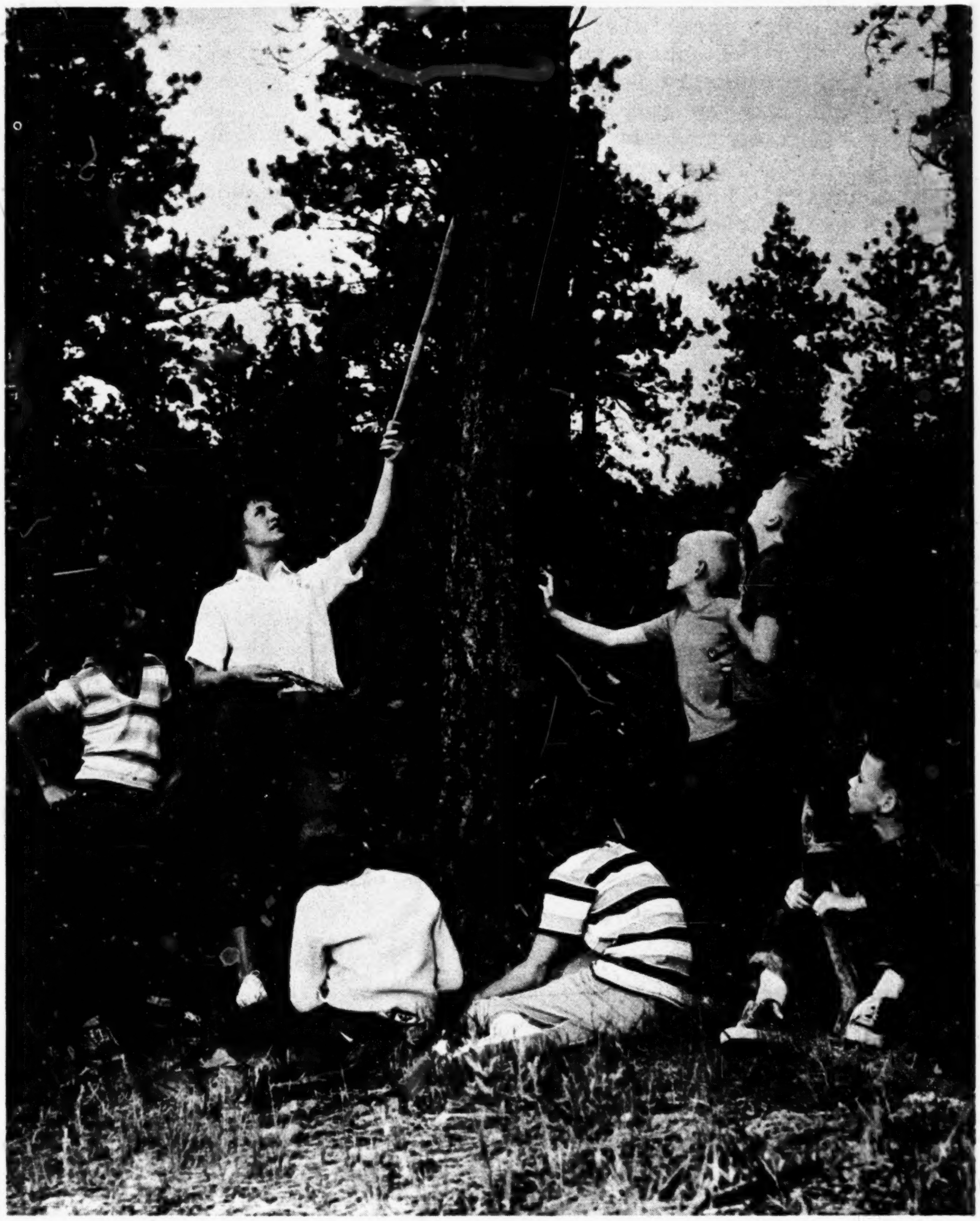
Point Number Two

We are looking into a grove of aspen which is a favorite habitat of the deer. Six to seven feet up, on the base of all the aspen, you see they are scarred by little niches. This is primarily from the elk coming down into this region and chewing the aspen during the winter.

The food of deer is primarily leaves and green twigs nipped from shrubs and small trees. This is called browsing. Deer and Elk like to lick a salt block just the same as cows and other domestic animals.

To our right, we see kinnikinnick, which is an Indian word. This plant grows in open forests and on exposed slopes from the foothills all the way to timberline. In the spring it has little white and pink jug shaped blossoms. In the fall it has red berries which are a delicacy to the black bears which are in this region. This explains the common name "bear berries". Kinnikinnick is an evergreen because the leaves remain green throughout the year.

The base of the Ponderosa Pine has an opening in the bark which is the result of fire. This allowed insects to enter the tree and hinder its growth.



LIGHTNING

Forces of Nature Can Destroy

Point Number Two-A

At the base of two large spruce trees, there are a lot of scales from spruce cones. This is called a Midden Pile. You can also see the tiny holes burrowed into the piles by squirrels. This is the work of a small gray squirrel called a Chickaree or Spruce Squirrel. This squirrel has a black line along its side. Up in the tree, you will find its nest. In the latter part of August, they will cut the cones off and let them fall to the ground. Then they will scale the cones and the seeds which they find inside. Since these squirrels do not hibernate, they will store many of these seeds in their furrows for use during the winter.

Point Number Three

There are several mounds of dirt around us. These mounds are made by pocket gophers. They receive their name from two large pockets of skin on each side of their mouth. These pockets are used to carry seeds to their underground burrows where they are deposited. These burrows may go one inch to eighteen inches down into the ground. In the winter the pocket gopher will push up this dirt under the snow. The snow melts off of these round or elongated mounds of earth quickly. The pocket gopher is a social animal, living in communities. They can be a nuisance to farmers.

To our right and in front of us, we can see blue spruce trees. This is the state tree of Colorado. The crown is typically dense and conical when young, but it becomes ragged and pyramidal with age. The trees before us have different shades of color. One spruce has a bluish cast and the other is quite green. The needles are rigid, triangular, and sharp. The spruce cones hang downward or are pendant. In the case of the true firs, the cones point upward. Douglas fir is an exception because it is not a true fir.

As we continue over the trail, we will see trees of various sizes. Some varieties of trees grow larger than others, but the growth of a tree is not determined entirely by the characteristics of a certain species. The condition of soil, climate, the quantity of water, and competition for sunlight effect a tree's growth.

Point Number Four

At this point, we see an old stump. This stump is decomposing. There are many things that play a part in destroying dead material. Lichens, fungus, moss, and weather in the forms of ice, snow, water, and wind, have an effect. Animals also contribute to this. Here is a good example of ants which are slowly tearing down and decomposing this stump.

Below the ant hill, at our feet, is a specimen of dwarf juniper. Juniper belongs to the pine family. Its needles are very sharp. In this particular species, the needles are whitish on the underside. The berries produced on the dwarf juniper are fragrant.

The large outcropping of rocks is also an example of the erosion and breaking-down process. Weather and plants through the ages have made these formations. These rocks were solid at one time. The many factors have broken these rocks into their present form. There are many lichens on these rocks. Lichens are pioneers in the plant families. They are the first plants to cover bare earth and rocks. A lichen is a combination of two plants: an algae and a fungus. The fungus absorbs and stores water, which the algae combines with sunlight to make food for both plants. The fungus produces an acid which eats into the rock or wood on which it is growing. This acid helps disintegrate the rocks into soil.

In this large outcropping of rocks there appears to be a game shelter area. The cave or shelter area has been used by various types of small animals and also larger animals such as the coyote. The Mountain Lion might lie under here. The Marmot, or woodchuck, likes to lie in such outcroppings. The Golden Mantle ground squirrel and chipmunk could also use these rocks for shelter.

Growing on top of the cave is a species of rock breaking plant. The leaves are rather broad and are softly hairy on their underside. This plant belongs to the Sanifage family. Sanifage means literally "rock breaking". They grow in cracks of the rock and play a part in splitting and decomposing the rocks.

The large, mature Ponderosa pine is abundant in this area. Ponderosa is the longest needle pine we have in Colorado. To our right, we see a Doublas fir with much smaller needles.

Point Number Four-A

Behind the stake and to our left is a log which probably was torn apart by a bear trying to get at ants for food. Notice the base end of the log was burned by an ancient fire. Most black bears weigh between 200 and 350 pounds, although larger ones have been found. Sometimes a black bear has a cinnamon or brown fur. A mother can have one cub with brown fur and another cub with black fur. Black bears can run very rapidly if they need to. They are also adept at climbing trees.

Point Number Four-B

Between Point Four and Point Five, there are many different species of trees. One of these is the Lodgepole Pine. This tree is used for lumber, cross-ties, mine timbers, fuel, and poles. Forest fire causes the Lodgepole Pine cones to burst open and reseed the burned area. This is one reason you will find complete stands of Lodgepole in some regions.

The leaves of the Lodgepole grow in clusters of two needles each. They are usually one to three inches long and have a yellow-green color. The cones are 3/4 to two inches long and often remain on the tree a long time. They also remain closed for several years. The important characteristics of this tree then are: the needles in clusters of two; unopened cones remaining on the branches for years following their maturing. It often grows in thick, pure stands.

Douglas Fir is also found in this area. The needles of the Douglas fir are scattered singly over the twigs rather than growing in clusters. The needles are 3/4 to 11/4 inches long. The needles are somewhat flat and blunt at the end. The cones have three-lobed bracts extending beyond the cone scales. The Douglas Fir is used for cross-ties, piling, fuel, and Christmas trees. It is one of our nation's most important lumber species.

Point Number Five

This point is located in a large Aspen grove. This is a favorite habitat of deer. The trails coming into this area are made by wildlife. The deer enjoy resting in aspen patches during the day time. There is also evidence of the work of the beetle larvae. The tracks cut into the sapwood of the tree is their work. They eat the thin, microscopic cambium layer of wood and the inner bark which is vital to the life of the tree. If they completely girdle (eat around) the tree, it will die.

There is indication that this area was gutted by fire. The large stump some distance to our left is a good example of one that was burned out internally.

The open area close to the aspen stand is a favorite habitat of the Blue Grouse which inhabits this area. Another name for the Blue Grouse is Fool's Hen because it will not fly until a person is extremely close to it. In other areas it is called the Dusky Grouse.

If we are alert as we walk along these trails, we will see droppings of mule deer, elk, and rabbit. The rabbits in this area could be both snowshoe and cottontail. Occasionally you will see a garter snake. This is the most common mountain snake and probably the only variety you will ever see at this elevation. It is completely harmless and does more good than damage. The rattle snake does not inhabit the high areas. Seldom are they found above 7000 feet elevation.

Another name for the quaking aspen tree is trembling aspen. The tree has been named this because the leaves tremble or quake. This trembling results from long, thin, flat stems which allow the leaves to flutter in the breeze. The aspen is also a choice food of the beaver. The inner bark seems very bitter to humans, but it is liked by different animals.

There is much litter on the ground in this area. To remove the logs and twigs would deprive the forest of organic material needed to enrich the soil. The decaying logs, limbs and leaves help keep the soil rich. They also prevent water run-off.

Point Number Six

This is another interesting rock formation. This, too, is Metamorphic Rock which has come to be in its present form as a result of change and pressures applied to the rocks for billions of years. Most of the rocks in this area are gneiss and schist. If more pressure were applied to this schist, garnets would form. Before these rocks became gneiss and schist, they went through many changes. To begin with, they were shale. The shale was put under great strain causing the mineral grains to line up at right angles to the pressure. The pressure continues. Slate is formed. As the pressure continues, the slate becomes rock phyllite, which is rather shiny. Still greater pressure and heat applied during millions of years changes the phyllite to schist. Gneiss is the next stage. It has large crystals and presents a streaked or flowing appearance. It contains a wide assortment of minerals. Garnets are sometimes found in the gneiss. The garnets found in this area are of little value because they are so soft.

There are some quartz rocks on the surface of the ground in this area. Pure quartz is white, but impurities give the quartz different hues. There is some rose quartz in this area also. Quartz is a reasonably hard rock.

There are some beautiful mature Ponderosa Pines in this area. The golden hue of their bark adds to their beauty. To the northwest of stake six stands a picturesque old stump which reminds us of modern art. This stump has been left in this shape by fire. While this stump may have a certain intrigue for us, fire in our forests does not. The Ponderosa Pine trees in this area are apparently healthy. You will notice that they have nice green foliage at the top. If they were dying, we would be able to see bare, dead branches at the very top. There are some trees that are dying at the top farther down the trail. Watch for them. Ponderosa may live well over 300 years. Some Bristlecone Pines at higher elevations may live to be 2000 to 2500 years old.

Ponderosa Pine leaves grow in fascicles of two or three each. The mature trees have a plated cinnamon-red bark and rounded cones with sharp prickles on the scales. The cone is three to six inches long. This tree has many other names. Some of them are Yellow Pine, Bull Pine, Blackjack Pine. This tree is considered a hard pine. Its wood is soft in comparison to southern hard pines or the hardwood from deciduous trees, but it is harder than many of the pines grown on the western half of the United States. It is used for construction, cross-ties, fuel, boxes, mine timbers, and poles.

The porcupine lives in the forest at this elevation. During the winter time, the porcupine will live in the tall coniferous trees, eating the cambium layer of the bark. They will often remain in one tree several months during the winter. Their appetite for the cambium layer of the tree has a very detremental effect upon forests. If they girdle the tree, it will die in a short time. During the summer they live off the shrubs, grasses, and bushes of various types. Down by the dump there is evidence of porcupine damage in the trees. Contrary to rumor, porcupines do not throw their quills. However, beware of that tail!

LOOKING TO FAR HORIZONS

Looking southwest, one can see a meadow which is the headquarters of the elk game reserve. This reserve is composed of several thousand acres of forest lands and has a carrying capacity of hundreds of elk.

Point Number Seven

The bushes around this point are Mountain Mahogany, one of the favorite foods of the mule deer. The Mountain Mahogany is a member of the Rose family.

From this point we can see timberline at the top of surrounding peaks. Above timberline is called the Alpine or Arctic-Alpine zone. The Alpine Zone is above 11,500 feet. The zone just below timberline is called the Sub-Alpine or Hudsonian Zone. We are standing in the Montane or Canadian Zone.

Looking across the valley we can see Mt. Evans. It is 14,257 feet high. Before Mt. Evans was uplifted, it was covered with more than 10,000 feet of sediments. Mt. Evans was probably more than 24,000 feet high before erosion started its weathering processes.

In the direction of Mt. Evans we can see a cirque. A cirque is a bowl shaped valley which is formed by the quarrying action of ice. It is a collecting place for ice and snow until a glacier is formed. A glacier is the accumulation of more ice and snow than can melt away during the summer period. Glaciers form near the tops of many of the high peaks in Colorado. There are about fifteen active glaciers in Colorado now.

Also at point seven is a large gneiss rock. The light colors are the original granite which are mixed in with molten schist, forming the gneiss rock.

Behind the rock is a Ponderosa Pine which has been struck by lightning. The burned branches are evident. Behind the Mountain Mahogany is a Ponderosa with the branches missing from one side. This, too, is the work of lightning. This seems to be a point that lightning strikes quite often. Look for other trees that have been hit by lightning.

Point Number Eight

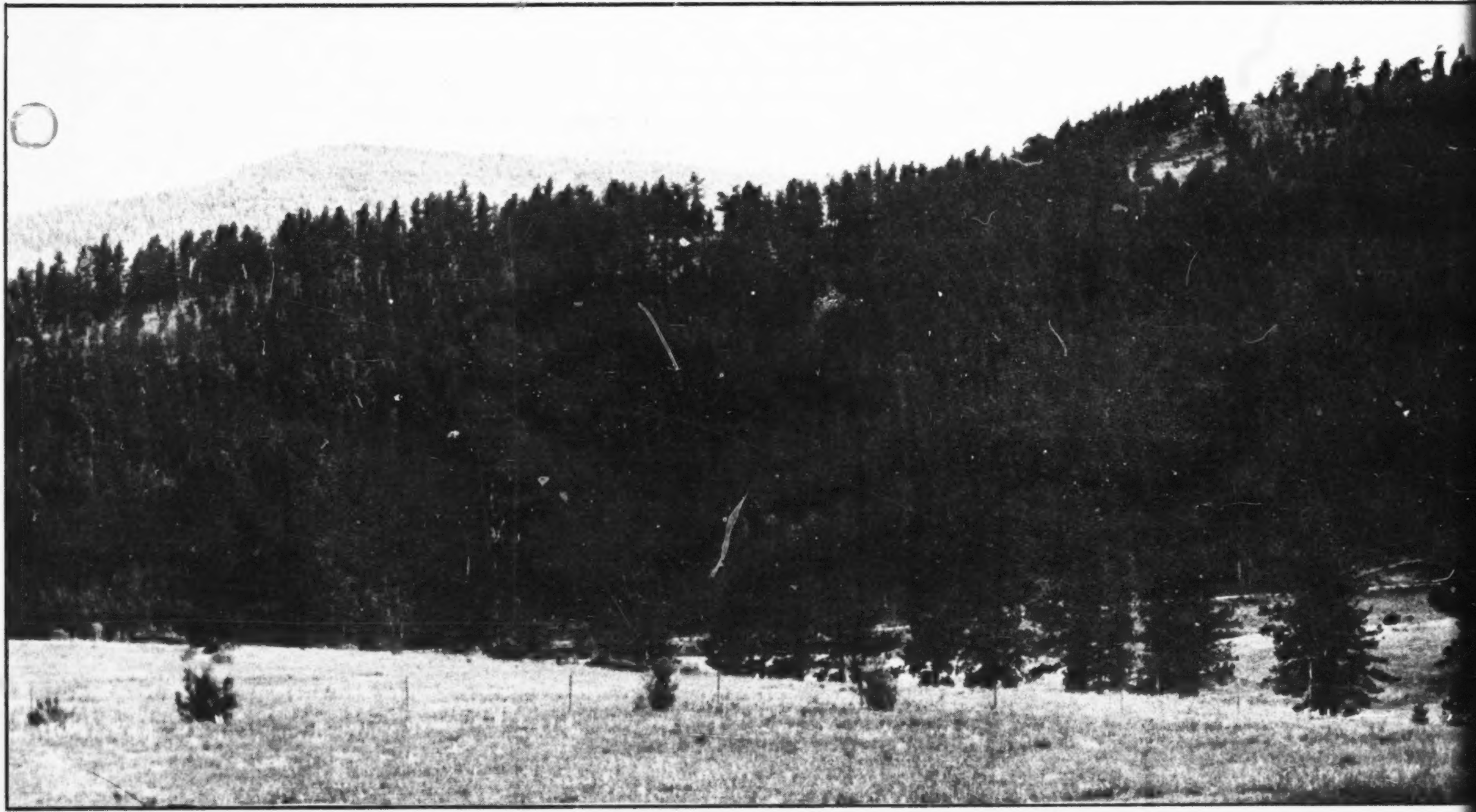
We would like for you to pause and look out over the valley and enjoy the panoramic view. The beauty of the forests and the many resources within them is the great heritage which is yours in this country. It is our desire that after your week at the Outdoor Laboratory, you will appreciate it much more.

The Meadows Trail -- Plan about two hours for this hike.

This trail starts at the Commons. It follows the entrance road to below the corral. Here it starts across the meadow. After various points of interest are noted while crossing the meadow, the trail comes to and follows the brook.

Point Number One

Directly in front of stake number one is a cut in the road which has made a profile of the soil. On top of the bank, grass is growing.



GRASS, SHRUBS AND TREES

By looking at the profile, you will notice that the roots of the grass grow deeper into the soil than the grass grows high. These roots die off later on and form the humus in the soil. They play an important part in making the soil rich and full of nutrients.

The slope of the road allows the water to run down the edge of the road. There is no grass or ground cover to hold the water back and aid it in soaking into the ground. The water which runs off of the ground takes the valuable top soil with it. This is a problem of the farmer and the rancher. If he does not plow his fields properly, he will get erosion which will wash away much of his valuable top soil. The finer top soil moves away with the water leaving rocks and the less productive subsoil. Farmers have learned to check the flow of water by contour farming, terracing, or in some cases by means of small dams which hold the water on the land and prevent it from eroding the fields.

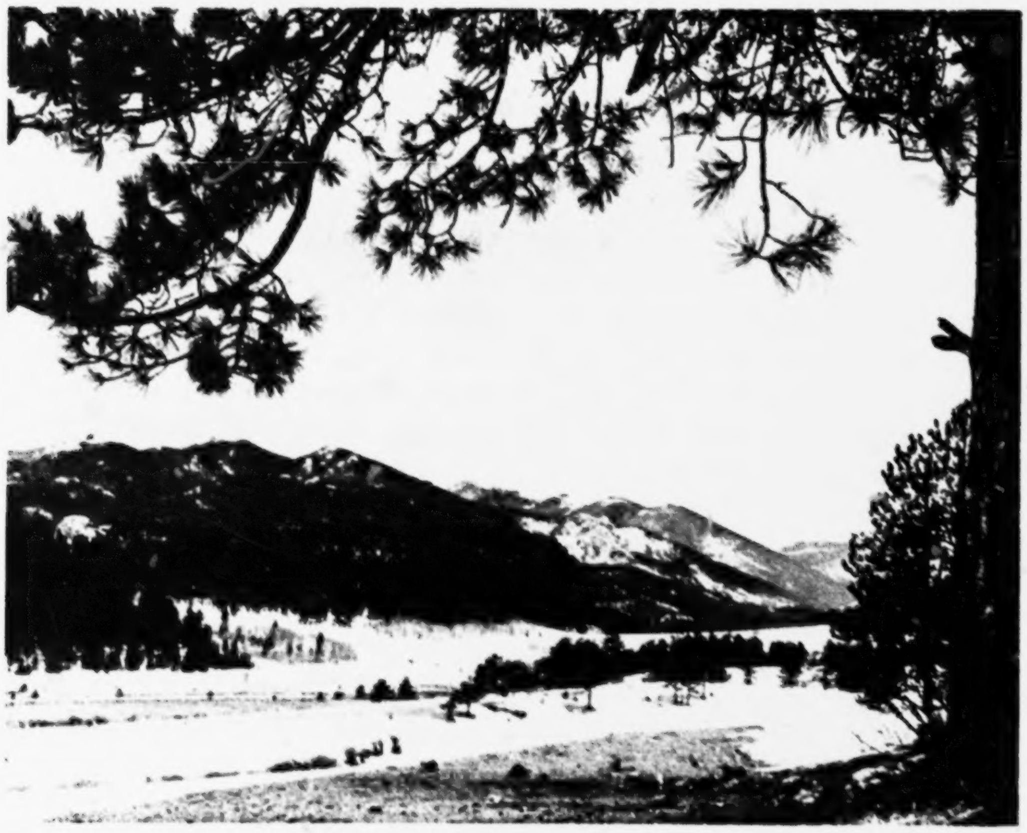
Also notice several holes in this bank. This is the home of some small animals. These are probably ground squirrels. The "road cut" has cut into some of their underground tunnels.

Point Number Two

There are many grasses in this meadow. In front of the little bridge is Red Top Grass. This species of grass grows to two or three feet in height. The stems are quite thick in diameter in comparison to many other grasses. The top spreads out with many little branches. Another grass in the area is Timothy. The flowers and later the seeds are crowded in a narrow spike at the top of the stem. There are different types of clover in this area. There are many plants called penny crest. These have wide seed pods. There are also some tall plants of the mustard family. They have very light yellow flowers. The common name of this plant is Jim Hill Mustard. Another plant, growing from 1½ to 2½ feet in height, is called Lamb's Quarter. People eat this plant much the same as we eat spinach. Europeans eat it more commonly than Americans do. These are only a few of the many species of plants and grasses in this meadow. Many of the larger animals depend upon grasses and plants of this type for food. This meadow has been overgrazed by cattle, horses and wildlife. This is why there is so much sage in this area. Sage is one of the first plants that comes in in abundance after land has been overgrazed.

Point Number Two-A

Here there are many shrubs called wax currants. One may feel of the leaves and notice their waxy surface. There is also some decaying wood. Bacteria and fungi are helping it return to the soil. On the rocks there are lichens which are composed of two types of plants. The part we see is a fungus plant and in the tissues, and mostly out of sight, is the algae. The algae supplies simple food that the fungus part cannot make, while the fungus protects the algae from too much sunlight, wind and drying out.



WINTER WONDERLAND

Point Number Three

From this vantage point, we can see Squaw Mountain Lookout to the northwest. From the late spring until late fall, this Fire Lookout is manned by a Forest Service Employee. Such a person must keep a keen lookout for fire. For several years a retired couple have managed this lookout. They have leased land at the foot of the mountain where they live during the winter. It was the wife who first discovered the smoke from the fire on Mt. Evans in 1962.

Most fires are caused by man's carelessness, although some are caused by lightning. On the Laboratory School property are several large trees which have been struck by lightning. This is evident because of some burned branches or scorched bark. Fire in the forests can take several different courses. They may burn just the crowns of the trees. If this is the case, much of the lumber can be saved. Other fires may burn along the ground and open wounds into the base of the trees. Fire along the ground destroys the litter and ground cover which helps hold the water. Sometimes fire may burn the roots under the ground. Air is obtained along the roots and through animal burrows. This latter type is somewhat rare, but does occur. Fire sometimes smoulders in the peat moss bogs for some time, doing much damage before bursting into flame.

Point Number Three-A

There are many sulphur plants in this meadow. This flower resembles an umbrella because of the way the stems support the flowers. There are also wild roses in this area. Their stems are very thorny.

Point Number Four

From this location we can see a variety of trees. The Blue Spruce are dominant. The Douglas Fir and Ponderosa Pine are growing abundantly here. There are scattered Lodgepole and Limber Pines in this area also. If you are fortunate you may discover a Bristlecone Pine. The north slope of a hill has less bright sunshine, accumulates more snow, and is therefore damper. This explains the great abundance of plant growth on the opposite hill as compared with the sparcity of trees on the ground where we are standing.

Growing around Point Four are more wild currants. This is one of the shrubs deer like for browse.

This meadow is a good place to study birds. There are three kinds of woodpeckers on the Laboratory School property; the Red-headed, the Downy, and the Hairy Woodpeckers. The Downy and the Hairy Woodpeckers are both common and nearly identical except for size. The Hairy is larger and has a much heavier black bill. Both males have a small red patch on the back of their heads. This patch is lacking on the females. The vertical white stripe down the back is an aid in identifying them. The Red-headed Woodpecker has much more red than the others. He also has more black and white. Woodpeckers have toes which enable them to cling to limbs and trunks of trees. They brace themselves with their stiff tail feathers. Their diet is composed mostly of grubs, ants, beetles and other insects.

There are also two kinds of sapsuckers; the Williamson's and the Yellow-bellied Sapsuckers. These have habits similar to those of the woodpecker. Sapsuckers feed on the soft inner bark and sap of trees. They dig row after row of small holes which sometimes girdle a tree.

An alert person will have plenty of opportunity to see Juncos. These birds are even-gray with clear white outer tail feathers and a rust-colored patch on its upper wing. The Junco is usually seen on the ground feeding on seeds. The female Junco is browner than the male.

The American Goldfinch is a colorful bird with a yellow body and black forehead and wings. It is often called the wild canary because of its color and lovely song. The female is less colorful, being olive-brown on its back and yellowish on its underside.

There are two types of Chickadees; the Black-capped and the Mountain Chickadee. The Chickadee's call is its name. Both have black caps, but the Mountain Chickadee has a white line over each eye. These little birds are quick and active. They aid farmers and forests by eating moths, caterpillars, beetles, and other insects. They also eat weed seeds. It is possible to get quite close to Chickadees, since they are not timid.

The remarkable Hummingbird also finds its habitat here. The fast moving wings of the hummingbird enable it to remain suspended in front of a blossom while it searches for food. The wings move so rapidly that only a misty blur or outline of them can be seen. During the nesting season the male becomes very protective. He will fight off enemies much larger than himself.

The Violet-green Swallow is a small graceful bird. It has long powerful wings. It has a large mouth which is adapted to catching flying insects which make up most of its diet.

Two other common birds in this zone are the well-known Robin and the Mountain Bluebird. The bluebird has a blue back, pale blue breast and white belly.

There are also many larger birds in this area. Some of these are the Magpie, Raven, Steller's Jay, Hawks, and Wild Turkeys. Steller's Jay has a black head, throat, and breast, and a long black crest. On its back are blue colored feathers. The ravens are larger than crows and have rough throat feathers. There is an albino raven on the Laboratory School property. This is fairly rare.

Point Number Five

Here is a metamorphic rock ledge out of which is growing a Douglas Fir tree. The tree has cracked the rock and left openings in which squirrels and other small animals make their homes. This outcropping of rocks is an indication of a rock formation lying underneath the shallow soil on this hill.

Point Number Five-A

Down below the outcropping of rocks is a type of plant known as "stone breakers." The common name of this particular plant is Wax Flower. This plant finds enough soil in these rocks to anchor itself and actually break the rock. In the summer time this plant has a little delicate white five-pedaled flower. Notice also the profuse growth of algae under the rocks.

Point Number Six

Along the stream we see profuse vegetation. This clear mountain stream is the home of small water animals or insects. The water snake may live in this area.

The hills surrounding this stream are the watershed for this small stream of water. This stream will join other streams on down the mountains, forming a larger stream of water. Eventually this water will, along with the waters of other streams, flow into the Mississippi River. Water from watersheds such as this one are of great benefit to the people living in Colorado. It will be used by homes, businesses and farmers. On the larger streams and rivers man has built dams which produce electricity and enable arid areas to have irrigation water. Pike and Long reported back to the government in the early days that humans could not live in eastern Colorado because of the lack of water. However, irrigation water has made it possible for many people to earn their living in this part of the state.

Point Number Seven

Beneath the ancient Ponderosa Pine is a small Limber Pine. The seeds of this particular tree are considered a delicacy by the squirrels and chipmunks. This prevents it from spreading too profusely. The Limber Pine is a five-needle pine; that is, the needles grow in fascicles of five each. The seeds are large and practically wingless. The branches are very, very limber. They bend extremely easily. The bark is grayish in color and the leaves are somewhat silky.

Behing the Limber Pine is a mature Blue Spruce. The needles on this tree are quite sharp.

To the right of our stake is a small wood fern. Ferns grow in damp, moist places.

Point Number Seven-A

At this point we see a large, ragged stump which is 20 to 25 feet high. This stump has been struck by lightning at some time. To our left is another tree which is probably dying as a result of disease or insects.

Point Number Eight

At this point there is much vegetation. There is a large Hercules Club growing among the willows. The head is formed in a globular shape. There is also some wild parsley. The leaf on the parsley is more like the shape of a Maple. The head of the parsley is flatter than that of the Hercules Club.

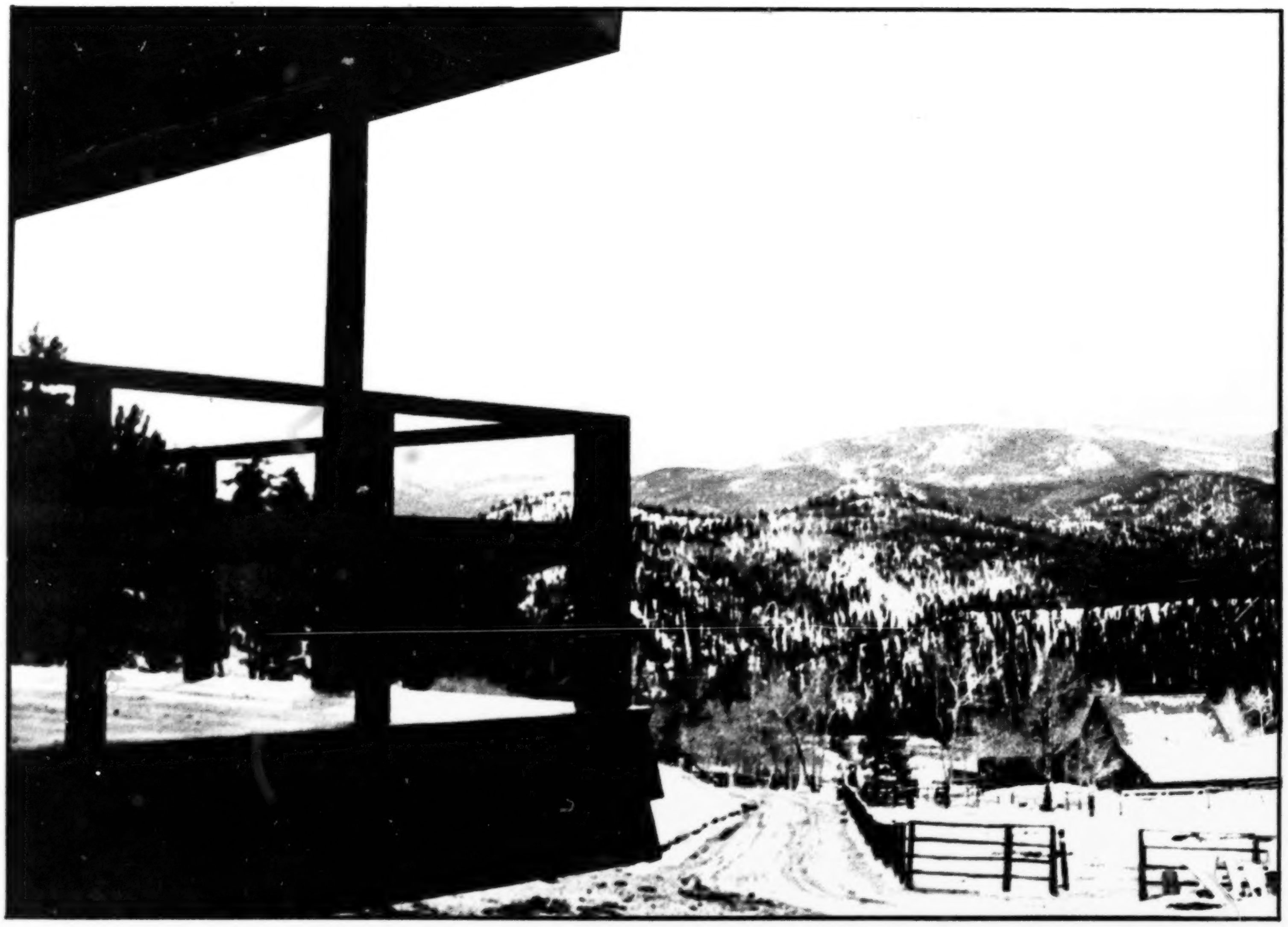
Around the stream there is a growth on the rocks which is called Jew's Ear. This small water plant is shaped like an ear. We would appreciate it if this plant is not disturbed. It begins to grow as a black spot. When it becomes mature it is quite translucent. Please replace the rock after you have observed these plants.

In the willow branches are some good examples of Pine Galls. This name is given to them because of their shape. The cause of the abnormal growth of leaves is a wasp. The beginning of a gall is a green, leafy rosette.. As it dries it takes the shape of a cone. Also on this same bush are leaf galls. Some of these are green and others are red.

Point Number Nine

The group of aspen trees on this slope probably indicates that there is underground water. We have six springs on the school property, but they are boxed in so we can have pure water. A spring is a result of water flowing into the ground at higher levels. It flows down between layers of rocks. The ground acts as a pipeline. Then at a lower level, along the side of a hill, the stream comes out in the form of a spring.

There are marks on the trees which are the teeth marks of the elk. Elk eat the bark in the winter time when other foods are scarce. The elk is a grass eater. It belongs to the bovine or cow family. The deer prefer the shrubs or browse plants. We say they browse when they eat the shrubs. They much prefer the shrubs to the grass.



WINTER BEAUTY

POST ACTIVITIES AT THE SITE

Discuss the nature trail experience. Compare the findings with what was expected.

Make a classified list of plants, animals, and rocks observed.

Note words to be added to the nature dictionary.

Mount and label specimens collected. Compare specimens and notes with resource samples and plates.

Select, for a special project at school, one or more items of special interest about which to read and report.

Rehearse and present the pre-planned skit for an evening or assembly project.

Complete the nature dictionary and classified lists.

Work on special-interest projects selected at Outdoor School.

Prepare exhibits of specimens. Make classified charts of plant, rock, soil, or other samples collected or observed.

Dear Mom: How would you like it if we had our very own snake? The one I caght is very
P. McRill

PART IV

Supporting Programs

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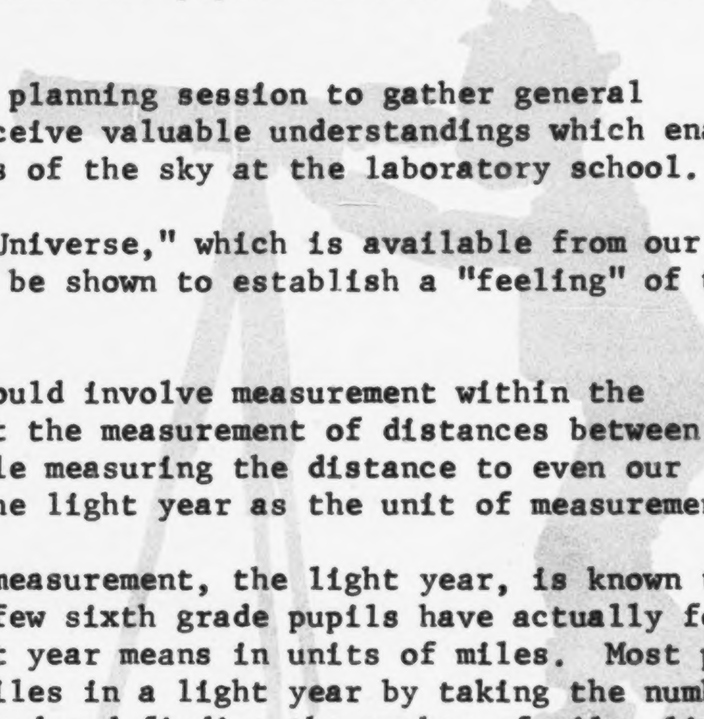
ASTRONOMY

Pupils come to the outdoor education laboratory full of questions and enthusiasm. They are enthusiastic about space because they are "at home" in the space age.

Now, man is venturing closer to the planets each year. Vast amounts of knowledge are being amassed. Some of these interesting features of the universe can be learned by the pupils.

In this unit certain guide lines will be given which will start the student on a study of the heavens--by no means will this be an entire course in astronomy. Rather, it is hoped that enough can be presented in an interesting fashion to enable the pupils to seek further information from other sources.



By using a short period of the planning session to gather general information, the pupil will receive valuable understandings which enable him to make better observations of the sky at the laboratory school.

The film, "Understanding Our Universe," which is available from our Instructional Aids Center, can be shown to establish a "feeling" of the vastness of the universe.

Other preplanning discussion could involve measurement within the universe. It can be noted that the measurement of distances between planets is given in miles, while measuring the distance to even our closest star involves use of the light year as the unit of measurement.

The definition of the unit of measurement, the light year, is known to most sixth graders. However, very few sixth grade pupils have actually found out for themselves what a light year means in units of miles. Most pupils enjoy figuring the number of miles in a light year by taking the number of miles light travels in one second and finding the number of miles light travels in one minute, one hour, one day, and finally one year. Having done this the pupil has a much clearer concept of the light year as a unit of measurement.

Children enjoy learning more about our satellite, the moon, and some of our closer neighbor planets. They are interested in the atmosphere, gravitation pull, and other facts about these "neighbors" of ours. When they gain a little knowledge of what things are like out there in space, their experiences at the laboratory school will become much more meaningful to them.

Simple star charts can be made before going to the laboratory school which can be of great help in locating star, constellations, and planets.

Most star charts appearing in current magazines are for the most part confusing to the beginner. It is suggested that these be used as guides in the construction of simple star charts by deleting all but a few of the major stars and one or two of the better known constellations.

Besides observing the stars and planets through the telescope the pupils can enjoy observing the sky with the naked eye.

A very easy way for students to begin locating stars and constellations is by the "clock and fist" method. This method of locating stars was developed by Mr. Henry M. Neely of the Hayden Planetarium and the directions given below are from his book The Stars by Clock and Fist. Given here are directions for locating but a few of the well known stars or planets; others can be found in Mr. Neely's book.

Everyone is familiar with the face of a clock and most have had the experience of hearing someone locate a position by referring to an imaginary clock. Using this method of giving directions in locating stars is a very simple one to use with children. Be sure, however, that north is always 12 on the face of the clock. With this simple direction it is easy to instruct the children what hour figure to face in order to locate stars.

The altitude or heighth of a given star in the sky can be found by using the closed fist. In order to do this, a child must hold out his arms at full length with the bottom, or little finger edge, at eye level. This measurement is referred to as "one fist high." Between the little finger and the ring finger is a "quarter fist high," between the ring finger and the middle finger, "one half fist high;" and between the middle finger and the index finger, "three-fourths fist high."

To measure more than one fist high, the pupil must locate a spot in the sky at the top of his fist, and without moving his eyes, raise the fist to bring the lower edge in line with the spot where the top was before. If this is done accurately, there will be nine fists from eye level to directly overhead. For the child to be able to do this with the night sky, practice is needed in the classroom.

It would be advisable to have the children familiar with the following concepts: (1) The child is standing in the center of the dial of a clock. The figure 12 of the imaginary dial must always be north. When the child faces 12 o'clock, therefore, he will be facing north. When he is facing 3 o'clock he will be facing east. At 6 o'clock he faces south and will be facing west at 9 o'clock. (Have the pupils locate objects around the room using hour figures to indicate direction of position.) For example, the teacher's desk might be at 4 o'clock or 11 o'clock depending upon where north is in a particular classroom. (2) The fist is a measurement of height. It measures 10° of altitude. In order for the child to use the fist measurement in locating stars, it will be necessary for him to become familiar with this method of measurement. Remembering that all measurements are from eye level, have the pupils measure the "fists-high" of various objects out the windows of classrooms.

When the child is adept at clock and fist measurement in the classroom he is ready to find the following stars in the night time skys. (Remember Polaris will always be at 12 o'clock on the imaginary dial.)

On the following pages are astronomy charts.

ALL READINGS ARE GIVEN FOR 8 P.M.

Sept., 15 - 28

Star or Planet	Direction by clock	Heighth by fists
Arcturus in Bootes	9-10	1½
Deneb in Northern Cross	2	8
Jupiter	3-4	2½
Saturn	5-6	3
Vega in Lyra	9	7½

Sept., 29 - Oct., 13

Altair in Aquila	7	5½
Deneb in Northern Cross	11	9
Jupiter	4	3 3/4
Saturn	6	3½
Vega in Lyra	9-10	6¼

Oct., 14 - 28

Altair in Aquils	8	4 3/4
Capella - Aurica	1-2	1 3/4
Deneb in Northern Cross	10	7½
Jupiter	4-5	4
Pleiades in Taurus	2-3	1 3/4
Saturn	6-7	3¼
Vega in Lyra	9-10	5

Oct., 29 - Nov., 13

Aldebaran in Taurus	3	1 3/4
Altair in Aquila	8	3 3/4
Capella in Auriga	1-2	2½
Deneb in Northern Cross	10	6½
Jupiter	5	4 3/4
Pleiades in Taurus	3	3
Saturn	7	2 3/4
Vega in Lyra	9-10	4

Nov., 14 - 28

Star or Planet	Direction by clock	Heighth by fists
Aldebaran in Taurus	3	2 3/4
Altair in Aquila	8-9	2½
Capella in Auriga	2	3½
Deneb in Northern Cross	10	5¼
Jupiter	5-6	5½
Pleiades in Taurus	3	4
Saturn	7-8	2
Vega in Lyra	10	3

Nov., 29 - Dec., 13

Aldebaran in Taurus	3-4	4
Betelgeuse in Orion	3	1 3/4
Capella in Auriga	2	4½
Deneb in Northern Cross	10	4¼
Jupiter	6	5½
Pleiades in Taurus	3-4	5½
Saturn	8	1
Vega in Lyra	10	2

Dec., 14 - 28

Aldebaran in Taurus	4	5
Betelgeuse in Orion	3-4	3
Cajulla in Auriga	2	5½
Deneb in Northern Cross	10	3½
Jupiter	7	5
Pleiades in Taurus	4	6¼
Pollux in Gemini	2-3	2
Rigel in Orion	4	2½

Dec., 29 - Jan., 13

Aldebaran in Taurus	4-5	6
Betelgeuse in Orion	4	4
Capella in Auriga	2	6½
Deneb in Northern Cross	10-11	2½
Jupiter	8	4
Pleiades in Taurus	5	7¼
Pollux in Gemini	2-3	3¼
Procyon-Canis Minor	3-4	2
Rigel in Orion	4-5	3¼

ALL READINGS ARE GIVEN FOR 8 P.M.

Jan., 14 - 28

Star or Planet	Direction by clock	Heighth by fists
Aldebaran in Taurus	5	6½
Betelgeuse in Orion	4-5	5
Capella in Auriga	2	7½
Jupiter	8	3
Pleiades in Taurus	6	7¼
Pollux in Gemini	3	4¼
Procyon in Canis Minor	3-4	3
Rigel in Orion	5	4
Sirius in Canis Major	4-5	2¼

Jan., 29 - Feb. 11

Aldebaran in Taurus	6-7	6½
Betelgeuse in Orion	5	5½
Capella in Auriga	12-1	8½
Pleiades in Taurus	7-8	6 3/4
Pollux in Gemini	3	5½
Procyon in Canis Minor	4	4
Rigel in Orion	6	4¼
Sirius in Canis Major	5	2 3/4

Feb., 12 - 27

Aldebaran in Taurus	7-8	6
Betelgeuse in Orion	6	5 3/4
Capella in Auriga	10	8
Pleiades in Taurus	8-9	5 3/4
Pollux in Gemini	4	6½
Procyon in Canis Minor	5	5
Regulus in Leo	3	3
Rigel in Orion	6-7	4
Sirius in Canis Major	5-6	3¼

Feb., 28 - Mar. 14

Aldebaran in Taurus	8	5
Betelgeuse in Orion	7	5½
Capella in Auriga	10	7
Pleiades in Taurus	9	4½
Pollux in Gemini	5	7 3/4
Procyon in Canis Minor	5-6	5½
Regulus in Leo	4	4¼
Rigel in Orion	7	3½
Sirius in Canis Major	6	3 3/4

Mar., 15 - 29

Star or Planet	Direction by clock	Heighth by fists
Aldebaran in Taurus	8-9	4
Betelgeuse in Orion	7-8	4 3/4
Capella in Auriga	10	6
Pleiades in Taurus	9	3¼
Pollux in Gemini	6-7	7 3/4
Procyon in Canis Minor	6-7	5½
Regulus in Leo	4	5
Rigel in Orion	7-8	2 3/4
Sirius in Canis Major	6-7	3
Venus	9	2 3/4

Mar., 30 - Apr., 13

Aldebaran in Taurus	9	2 3/4
Arcturus in Bootes	3	2¼
Betelgeuse in Orion	8	3 3/4
Capella in Auriga	10	5
Pleiades in Taurus	9-10	2¼
Pollux in Gemini	8	7
Procyon in Canis Minor	7	5
Regulus in Leo	5	6
Rigel in Orion	8	2
Sirius in Canis Major	7	2½
Venus	9	5

Apr., 14 - 29

Arcturus in Bootes	3	3 3/4
Betelgeuse in Orion	8-9	2½
Capella in Auriga	10	4
Pollux in Gemini	9	6
Procyon in Canis Minor	8	4¼
Regulus in Leo	6	6¼
Spica in Vergo	4	2
Venus	9-10	2

Apr., 30 - May, 15

Arcturus in Bootes	3-4	4½
Capella in Auriga	10	3
Pollux in Gemini	9	4 3/4
Procyon in Canis Minor	8	3 3/4
Regulus in Leo	7	6
Spica in Vergo	4-5	3

ALL READINGS ARE GIVEN FOR 8 P.M.

May 15 - 28

Star or Planet	Direction by clock	Heighth by fists
Arcturus in Bootes	4	5½
Capella in Auriga	10-11	2
Pollux in Gemini	9	3½
Procyon in Canis Minor	8 - 9	2¼
Regulus in Leo	7-8	5¼
Slica in Vergo	5	3½
Vega in Lyra	2	2

ART EDUCATION AT THE OUTDOOR SCHOOL

Outdoor education is intended to afford new experiences which develop new insights and broader concepts in relation to school experiences. If these experiences are to be enjoyed to the fullest, they should be done in a natural setting.

The suggestions presented here might serve as a launching pad for both teacher and pupils. One of the most delightful things about art is its great flexibility. Its possibilities are limited only by the imagination of those involved. When selecting art experiences for children, stress an exploratory and experimental approach, taking into consideration individual growth, freedom of expression and individual use of media.

Art activities should utilize the local environment. Remember that the children's art work will be one of the most important records of their experiences at the outdoor laboratory school. Provision should be made, when planning the outdoor education program, to provide opportunity for art experiences. This may best be done by building a background of experience, motivating the experience, organizing art materials, planning for the work period, meeting the children's needs during the work period, and evaluating the experience.

Teachers should be alert at all times for opportunities to direct the children to items of local art interest. Through the use of meaningful observation, art can instill in the child a desire to explore; foster an urge to seek explanation, read, discuss and continue to observe; create an immediate feeling of joy and appreciation for things beautiful; and set the stage for creative expression through the use of various media and techniques.

*The growth pattern, or design, of the personality of an individual very closely parallels design as we observe it in nature. Art can help to apply this parallelism in that as objects are observed in nature and as the child participates in art experiences in outdoor education, his art expression matures as he matures.

In design, as we observe it in nature, each part is created to serve a purpose; each part is interestingly appealing in its own way; each part is useless without the other; and each part is carefully placed with the other parts to create unity, oneness and a beautiful whole.

In design, as we observe it in social growth, each person has his place and his responsibilities in this world of ours; each person can try to do his best; each person is almost useless without friends and associates; and each person working and living with others in an understanding, cooperative, energetic way helps to create a unity so needed in designing society today.

*Marion, Discovering Design

The following will help to effect a good art program:

Develop a method of organization, distribution and storage for a variety of art materials.
Plan a program for the entire period the group will be at the school.
Include experiences in manipulation, picture making, three-dimensional activities, design, lettering, and appreciation.

While the children participate in art activities, and apply the principles and techniques they have learned, they will receive the most benefit and get the biggest thrill from being able to express themselves in a natural and not too structured learning situation. The natural surroundings and the beauties of nature can best be depicted by the child when he is free to create and interpret in his own way.

Getting Ready for Experiencing Art Out-of-doors

Some things for the children to think about and do before going to and after arriving at the outdoor education school are:

Preparing themselves to see how carefully they observe things around them.
Testing themselves to see how many things they failed either to see or remember.

Encourage them to develop their thoughts through:

Curiosity about things in their environment.
Exploration to find these things.
Experimentation to help understand.
Expression to share ideas and impressions with others.

Media for Conveying Impressions, Interpretations and Ideas to Others

Figure drawing

People are a vital part of outdoor education. Children will need to represent them in expressing their experiences at camp. Think how much the children would enjoy drawing the cook, the principal's little girl, the teacher in her hiking togs, the school bus, the pony, the dog and many other possibilities.

Perspective

Objectives vary in proximity and position, and consequently seem to change in size and shape. A bit of investigation of perspective (parallel, angular and curved linear) will help the children to sketch interiors of buildings, fences, roads, streams, buses, weather stations, etc., and to have them look as they want them to look. The buildings at the school site offer a wealth of opportunity for experiences with perspective.

Color

Many colors will be discovered at camp. To make the paints and chalks say what the children want them to say, they may find real fun to discover (1) what color is, (2) how to make different colors and textures, and (3) how to change a color so that it is lighter, darker, softer, duller or brighter. A preview of color harmonies will help children discover pleasing color combinations in nature.

Design

Nature is the master of design. To be able to discover examples of good design in nature when the children go exploring at camp, a bit of experience in creating designs will be found to be helpful. Children in the sixth grade should be able to recognize satisfactory designs when they see them. They should remember that a pleasing design has satisfactory combinations of unity, of line, form, space, color and texture. Children should explore many different materials, experiment by using them in various ways, discover their possibilities and limitations, and arrange them with understanding in order that they may appreciate how design is created.

Techniques

Some of the more common techniques which might be helpful for the children to use in interpreting their ideas are listed. A little experience with several of them to determine which one is best to use to portray their impressions of their outdoor experiences will be helpful.

Sketching - pencil, crayon, charcoal, chalk, brush, etc.

Painting - water colors, tempera, oils, inks, Dek-all finger paints, etc.

Printing - stencil, silk screen, spatter, block, pressure, spore, contact.

Enameling on copper - simple jewelry, ash trays, etc.

Metal tooling - embossed designs on metal foil.

Etching - on metal, glass.

Wire craft - pipe stem cleaners, Flencraft (wire plus plastic span).

Ceramics - models, tiles (incised, scraffito, relief), pottery, press mold casting.

Batik - resist method of applying design with melted beeswax and dye.

Applique - natural materials (leaves, seeds, etc.) or motifs suggested by forms in nature cut from paper, cloth, metal foil, etc., and applied on a surface in simple composition or repeats.

Paper sculpture - three-dimensional forms created in paper or lightweight cardboard.

Following are some general suggested activities which might be helpful. Several different kinds of media might be used.

Explore your experiences and record what has been learned, using reference to kinds of line, form, color, texture, space, motion and sound.

Collect and save carefully simple examples of fine designs of line, form, color, etc.

Sketch some typical experiences at camp.

Sketch a favorite object or scene. Sketch what is seen. Think about the following points when sketching to indicate what has been learned in basic art: What shape is being illustrated? What lines? How do lines compare with each other in size? How do shapes compare with each other in size? How are lines and shapes put together? What is the final over-all shape when parts are put together? Are colors used for a purpose? Is there harmony in the color combination?

Suggest to the children that they paint their impressions of scenes or happenings which suggest such things as: happiness, excitement, peace and quiet, exploring, experimenting, warmth of noon day, coolness of the evening or dawn, a walk along the stream, a walk up the valley, or a path of native animals.

Cut paper forms suggestive of things the children have liked, and arrange in good composition on paper.

Make a stencil all-over pattern of motifs (leaves, insects, trees, people, etc.) found at camp.

Make a stick print design using twigs cut so that the cross section is used much as a stamp pad.

Murals depicting individual or culminating experiences might be used to engage small or large groups. Discussion should follow for an evaluation of the experience. This activity would serve as an excellent method for review.

Carry-over Art Experiences Upon Return to School

Sketches of the school site.
Make posters to stimulate other groups' interest in visiting the school.
Make charts to explain interesting experiences, or to indicate specific learnings.
Make illustrations for stories in the school's newspaper.
Design a blockprint or silk screen for newspaper or for data folders on the outdoor education program for teachers.

Create textile designs from camp motifs, and apply to cloth printing, applique, or batik.
Apply design to simple metal work--aluminum, copper, etc.
Make mobiles and stabiles to interpret observations. Some suggestions are: birds, crawling creatures, foliage, fantasy, sparkling color, fascinating forms peculiar to the geographic area.
Prepare an assembly program in which the group share their out-door-school experience with other classes.

HEALTH AND SAFETY

Every precaution should be taken to ensure complete safety and continued good health for all children and staff members at the school.

Staff

A registered nurse spends two hours each day at the school. At this time she checks all children who are referred to the clinic. A written report is made of every child sent to the clinic, giving the nature of the case, diagnosis and treatment. The principal of the school holds a current Instructor's First Aid Certificate, as does the program coordinator. This ensures health and safety services when the nurse is not in attendance.

The R-1 schools retain the services of two practicing physicians in Evergreen, Colorado. They are available by telephone at all times for advice and consultation. Arrangements for transportation are provided when emergencies require that a child be taken to the doctor's office. If the patient's condition is too critical, the doctor will come to the school and treat the child. The school's telephone number is 112-674-3633. Transportation facilities are always available, day or night.

Clinic

The clinic is located in the main building, which is the home of the principal and also houses his office. It is well stocked with supplies and reserve materials. Two cots are provided for children to use. Linens, including towels, sheets, pillow cases, rubber sheeting for the cots, are adequately supplied. Laundry service for all clinic linens is provided by a commercial laundry.

Health Inspection

Children are inspected by the school nurse before they leave for the outdoor laboratory school. If any indications are noted that the child may not be in good health, he is detained. Should his condition improve, and upon receiving an O.K. from either the nurse or doctor, his parents may take him to the school to rejoin his classmates. The outdoor education nurse checks the children in the afternoon of the day they arrive at the school to ensure that all children are in good health. If at this time a child indicates he is, or is becoming ill, his parents are contacted. If there is any question as to his state of health in relation to the other children, he returns home.

A list of the children participating in the program accompanies them when they report to the school. Included on this list is the following information: name of school, name of teacher, name of parents or guardian, their address, home and business telephone numbers, name of family physician and his telephone number. The telephone number of the outdoor education school is made available to all parents whose children attend the school.

The school's staff plans carefully for all the children who attend the school, that they can enjoy their experiences with their classmates, and at the same time avoid hazards to their safety. When the nurse inspects the children, she singles out children who may need care of blisters, cuts, and other conditions that are not serious, but might become so if neglected.

Children are instructed to report any feeling of illness or any injuries, even those that may seem trifling, so that prompt attention may be given. If a child becomes ill, however, it is wise to call his parents and have him taken home for treatment. To have to leave before the week is up is naturally a very disappointing experience for any child, but health considerations are always of primary concern.

Boys and girls are soon taught to recognize that their safety depends more upon forethought and planning than upon reading of rules of safety.

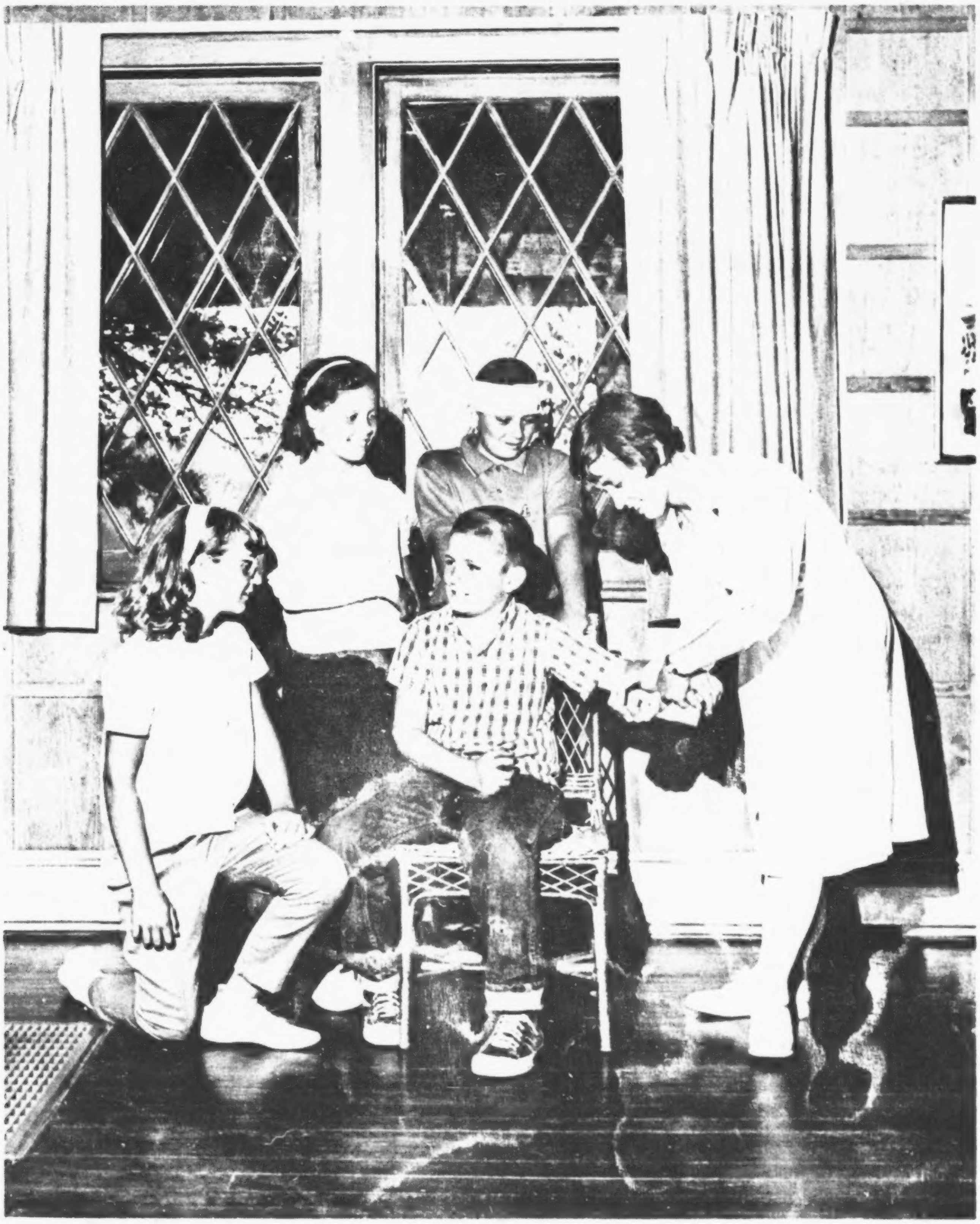
Safety and health standards are observed in meal preparation. Great care is taken to serve the most wholesome foods. Hygienic standards of the county and state board of health are fully met in the school's kitchen. The menus are planned and supervised by the R-1 food service dietitian.

Since rest is necessary for growing children, a quiet rest period is observed every afternoon. Children are in bed by nine o'clock each evening and are up at seven each morning.

Fire Drill

The main fire alarm switch is in the lodge. This is connected with a fire alarm switch in every other building. The signal for evacuation of all buildings is a steady blowing of the fire alarm horn. Every building is also equipped with fire extinguishers. The cafeteria has specially marked fire exits.

On hearing the fire alarm signal, all children leave the building immediately and report to a place a safe distance away from it. They remain there until the source of the fire has been determined. In case an exit should be blocked, children are instructed to go through a window.



LESSON IN FIRST AID

HEALTH INSTRUCTION

Staff members do not take for granted that all children know and observe the necessary health and safety rules they will need to have a happy experience at the outdoor education laboratory school. Following items should be given special emphasis.

Good Health Practices Should be Discussed:

Daily care of teeth
The importance of regular habits of eating, sleeping, and bathing
Washing of hands before meals
Use of the lavatory before going on the trail, to class, or on the bus
Good habits of elimination are very important when the food, routine, and facilities are different

Care of Clothing

Care of clothing should be exercised - both clean and soiled. Soiled clothing should be placed in a plastic bag.

Following the afternoon rest period, a luggage check should be made to ensure neatness and sanitary care of clothing.

Safety

Teach the danger of the following:
"Horse play" on the trail, in the dormitory, etc.
Putting objects in people's beds
Running on the trail or where the main buildings of the school are

Trail Safety

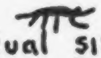
Discuss good trail safety:
Be on the alert for whipping branches on the trail
Watch for loose stones and rotten logs
Do not drink from water sources without checking with the teacher or guide
Turn feet sideways when climbing a steep slope
Stay on the trail
Stay away from animals no matter how friendly they seem. The animals may be sick. Rabid skunks and rodents, particularly, may seem friendly.

Ticks

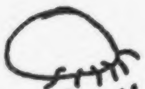
Tick is the name of a small animal which is related to mites, spiders, and scorpions. It is oval in shape. The tick is a parasite, which means that it lives on other animals.

The bodies of these tiny animals seem to be in one piece. The head of a tick is a movable part at the front end of the body. They draw the blood of their victims through a beak. The beak has strong teeth which are bent backwards. These teeth help the parasites cling tightly to their host. Adult ticks have eight legs which stick out on the sides like those of a crab.

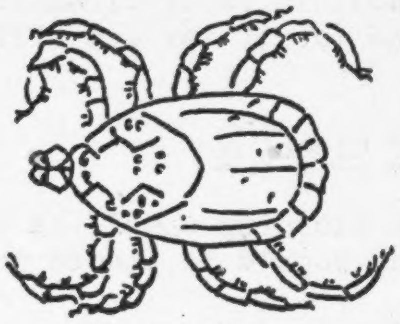
While at the outdoor education laboratory school students may find a tick on their body. Teachers should inform their students to check themselves for an imbedded tick. If they discover one, the Dorm counselor should be told. Be sure students understand that ticks are not to be pulled out by force. The principal or program coordinator will know how to properly remove the tick.



Actual size
before Feeding



After feeding
tick becomes large
light gray in color.



Food Menus

Plan a cook-out lunch using cooking foil
- Discuss safety to be observed during the cook-out
- Matches will be used only by those assigned to "fire duty"
- Fire coals may be hot even though they look black
- The foil should be opened with caution after the food has been cooked
- Only "fire duty" students should stay near the fire

Homesickness

Children may become homesick while at school. This usually occurs at bed time, but it can happen at other times. Teachers should not ignore the child. A little attention and interest will usually give a feeling of being wanted to the child. By taking time to discuss the interesting things yet to be done will help to create an interest and a desire to remain at the school. Should homesickness occur during the day it often helps to have another be a big sister or brother for awhile. The teacher should periodically check to see if the child is overcoming his homesickness.

SAMPLE UNITS

Teachers may find their children are interested in some particular area of the Core Program. To meet this need they might like to develop a unit with the children during the pre-planning period. Three units have been included as suggestions. Sandra Walter's excellent unit should inspire others to follow her example. The curriculum department would appreciate receiving copies of any units developed that they may be reproduced and made available to other teachers.

WILDLIFE CONSERVATION

A study of wildlife should begin with local resources. In heavily settled or intensively cultivated areas, it is not possible to study firsthand the ecology or large game, fur or other animals, but common species like rabbits, mice, squirrels, and numerous species of birds may be studied in any part of the country. The direct approach to the study of wildlife ecology, which is the key to wildlife conservation, is by way of knowledge of the species present in the student's own locality.

Every boy and girl, every man and woman, has a definite responsibility in the perpetuation of wildlife. This is one natural resource which belongs to all people no matter where it may be found. While governmental agencies are entrusted with the management of wildlife, the cooperation of every citizen is essential. One should study and know enough about our wildlife to have a sympathetic and discriminating attitude toward recommendations for its management. The duty of recommending and supporting sound conservation legislation is also the privilege of the citizen. The observance of good outdoors manners and of conservation regulations are other responsibilities of our citizens.

Outline - Wildlife Conservation

I. SIGNIFICANCE OF OUR WILDLIFE

- A. Wildlife values - past and present
  1. Economics - food, clothing, shelter, employment
  2. Recreation - hunting, fishing
  3. Aesthetic - birds and animals which provide enjoyment because of their beauty of form or color, pleasing song, interesting ways

II. WILDLIFE POPULATION
(Wildlife population includes all birds, animals, and fish not domesticated by man. The animal kingdom includes all living things that cannot be called plants)

- A. General classification of our wildlife species:
  Birds, Mammals, Fish, Amphibians, Reptiles, Invertebrates

III. NATURES BALANCE FACTORS

- A. Reduction and change of natural habitat of wildlife
  Examples:
  1. Development of agricultural land for crop production

2. Over-grazing
3. Removal of native vegetation
4. Drainage of swamp and marsh areas
5. Pollution of waters
6. Development of urban areas
7. Fires

B. Abuses of wildlife resources - Examples
   1. Abusive commercialization: Excessive hunting, trapping, and fishing for the market. (A traditional practice in early history to supply community, lumbercamp, etc., before wildlife regulations had been enacted. Still being practiced by commercial violators in defiance of the laws at the present time.)
   2. Abuses of existing wildlife regulations: Hunting and fishing out of season; taking more game and fish than bag and possession limit allows; illegal practices such as dynamiting fish, headlighting deer.

C. Need for better wildlife regulations and enforcement
   1. Enactment of practical laws difficult because: lack of adequate knowledge and research about wildlife; public demand by pressure groups conflict with sound wildlife regulations.

IV. POSSIBLE OUTCOMES

A. Knowledge and understandings
   1. Knowledge of the kinds, characteristics, extent, and value of wildlife in the locality, state, and nation.
   2. An understanding of the numerous ways in which wildlife contributes to the life and living of man.
   3. An understanding as to how wildlife welfare is dependent upon "balance in nature".
   4. A knowledge of wildlife conservation services, and how such services may be utilized in the development and successful operation of a wildlife program of protection and restoration.
   5. A knowledge of how each student may contribute to wildlife conservation.

B. Attitudes and Appreciations
   1. An appreciation of man's custodial responsibilities in reference to wildlife.
   2. An abiding interest in wildlife literature and the skills necessary to interpret, evaluate, and organize data concerning wildlife.
   3. A recognition of the place of law in a wildlife conservation program and a wholesome respect for such law.
   4. The will to put forth continued effort in the direction of some phase of wildlife conservation effort.

V. INVENTORY OF POSSIBLE ACTIVITIES

A. Initiatory Activities

1. Explore the community to determine the kinds and extent of wildlife found in the locality
2. Interview early settler of community on question, "How has wildlife of community changed during last half century?"
3. Build and operate a bird feeder to use in study of bird life.
4. Visit a local fur ranch, pheasant rearing pens, or fish hatchery.
5. Invite resource people, such as game and fish man or Forest Ranger, to talk to class. (Endeavor to obtain people from local area)
6. Show animal films.
7. Collect and mount pictures of wildlife found in community.
8. Write agencies for available materials and literature. DO NOT HAVE MORE THAN ONE PERSON SEND TO THE SAME AGENCY FOR DESIRED MATERIALS.
9. Find materials in books and magazines which concern wildlife.
10. Make a list of birds you can identify and record their mating habits, food, etc.
11. Read a poem about birds and wildlife to your class.
12. Draw or sketch a bird or animal in its natural habitat.

B. Activities and Discussions

1. Developmental Activities
   - a. How did wildlife in the U.S. aid the early settler? After study of wildlife conservation, indicate how wildlife is of greater importance to man today.
   - b. What major industries are dependent upon the wildlife harvest and how can this importance be shown?
   - c. Develop a bulletin board on which you show how wildlife contributes to the life and living of man and how man may contribute to the life and living of wildlife.
   - d. Name ten common migratory birds and chart their routes on a map of the Western Hemisphere.
   - e. Make a survey in which you show:
     - (1) Kinds and numbers of wildlife animals common to Colorado
     - (2) Characteristics common to those animals
     - (3) Description of their habitat
     - (4) Kinds of common food which they consume
     - (5) Migratory habits of any kind
     - (6) Value
   - f. Make plaster casts of tracks of birds and mammals, and identify.
   - g. Survey your county for the following:
     - (1) Kinds of lakes and streams
     - (2) Kinds of fish found in those lakes and streams
     - (3) Conservation practices carried on
     - (4) Improvement possibilities of the habitat of fish in these lakes and streams
   - h. Make a survey of the reptiles and amphibians of locality to determine the following:
     - (1) Habitat and habits

(2) Food
(3) Reproduction
(4) Ways in which they help or harm man

i. What effect did the commercial game hunter have upon our wildlife?
j. What contribution has science made in the development of insecticides and how may the wrong use of these insecticides affect the balance of life in nature?
k. How has the bird population changed during the past fifty years? Account for this change.
l. How can the habitat for bird life in your county be preserved and improved?
m. Make a list of the common enemies of bird life.
n. Make a chart of plants which supply food for birds.
o. Obtain a copy of the Fish and Game Laws for your state. Study and discuss reasons for open and closed seasons, bag limits, and reason why certain areas are closed or open to hunting and fishing.

2. Discussion Questions (These questions parallel foregoing experiences)
   a. How does wildlife contribute to man's effort to obtain food, clothing, shelter, and employment and recreation?
   b. Give the major divisions of wildlife population.
   c. What has the history of wildlife protection legislation been in Colorado? Why has legislation been necessary?
   d. Explain the characteristics of a true sportsman in reference to hunting, trapping, and fishing.
   e. Discuss farmer-sportsman relationship and suggest how it can be improved.
   f. What is the purpose of bird banding and fish marking?
   g. Discuss the harvesting of game species. Why is it necessary at times to protect them and at other times to remove the surplus?
   h. Discuss relation of the planting of fish to the control of environment.
   i. In what ways are the local, state, and national governments contributing to the preservation of wildlife? Should the services of one or more of these agencies be modified or extended? Explain how.
   j. Find studies which indicate that owls and hawks are not as harmful as many people assumed and give reasons for this change of attitude.

C. Culminating Activities
   1. Have each member write a conservation code which he would be willing to use as a personal conservation conduct guide.
   2. Write a set of safety rules for outdoor people - hunters, fishermen, trappers, vacationists.
   3. Explain the care and consideration a helpful and cooperative camper will give to his camp and campsite during his stay in the woods.

4. Write and present a radio program to your school on one of the following:
    a. The match is a dangerous instrument when carelessly used.
    b. How our school helps in the state-wide conservation program.
    c. Nature moves toward the development of essential balance.
    d. Topics of your selection.
5. Write a newspaper article in which is publicized some noteworthy conservation problem in your community.
6. Hold a panel discussion upon the topic, "What the conservation program of our community should include."

VI. EVALUATION SUGGESTIONS

A. Have pupils developed a fair understanding of the meaning and application of various concepts included on wildlife?

B. Does the student recognize the social implications of conservation?
   1. Does he cooperate with others in furthering practical wildlife conservation values?
   2. Does he show growth in tolerance of others who may differ in their thinking with him in their wildlife conservation thinking?
   3. Does he appreciate the contribution that wildlife conservation can make to life and living generally?

C. Does the pupil show that he has improved certain individual skills through the effort in this area?
   1. Better ways of thinking, judging, and working
   2. Improved expression
   3. Can he organize and summarize the wildlife values in keeping with the scientific method?

D. Does he approach and solve wildlife problems in keeping with scientific method?

E. Has the pupil developed an abiding interest in the contributions which science is making to the development of worth while wildlife values?

WEATHER

I. OVERVIEW

Men have been trying to predict what the weather will be since very early days. Beginning with superstitions, they finally developed scientific methods of determining what the weather might be. There are a multitude of factors causing weather and its changes, but for the purpose of this study, only those relating to the vicinity of the Outdoor Laboratory School need to be investigated. The various instruments needed to study the weather can be either purchased or made by the students. No attempt has been made here to give directions on how to make these instruments, but such directions can be found easily elsewhere.

Living in the outdoors most of the time while at the Outdoor Laboratory gives a wonderful opportunity for the students to see, feel, and detect any evidence or warnings of change in the weather and predict what the change might be.

II. OBJECTIVES

A. To develop the ability to foresee changes in the weather.

B. To become aware of the many factors affecting weather.

C. To develop an awareness of the interrelationships of weather with other features of the natural environment.

III. INITIATION OF UNIT

A. Discussion of any unusual recent aspect of the weather.

B. Have pictures of clouds, storms, or other weather features on the bulletin board.

C. Read a story where weather has played an influential part.

D. Bring in the map of the weather report to discuss.

E. Collect and discuss some superstitions or primitive beliefs about the weather.

IV. PROBLEM: HOW DOES THE WEATHER AT THE OUTDOOR LABORATORY SCHOOL COMPARE WITH THAT OF DENVER?

A. Gather evidence in the classroom through books, films, and resource people.

What do we mean by weather?

1. Comparison with climate. Weather results when air is in movement. The atmosphere cannot tolerate unevennesses of pressure and must flow from high to low. This produces winds, temperature changes, rain and snow. Climate is weather over long periods and represents the average and extreme conditions.

2. Clouds

   a. Rising clouds mean clearing weather.

   b. Two layers moving in different directions indicate unsettled weather.

   c. Kinds of clouds

      Cirrus - high, wispy and delicate clouds composed of ice crystals and occuring at high altitudes.

      Stratus - layered, usually gray and fog-like.

      Cumulus - billowy, cotton-like puffs which result from rising currents of air.

      Nimbus - gray clouds bearing rain.

      Thunderhead - combination of cumulus and nimbus that can be quite spectacular to watch as they boil and pile up before bringing a storm.

3. Precipitation

   a. Rain - when warm, moist air meets cold air, condensation takes place.

   b. Snow - when mineral dust particle meets supercooled vapor in extreme cold, a snow crystal forms. As it drifts into warmer air, it unites with others, becoming a snowflake.

4. Pressure

   a. High - a region where a great mass of air collects, usually means fair weather.

   b. Low - a region where much of the air has escaped, usually indicates stormy weather.

What causes changes in the weather?

1. Winds and Fronts

   a. Mountain breeze - cool wind flowing off the cool mountain slopes into the valleys.

b. Chinook - warm, dry, westerly wind which blows down the eastern slopes of the Rocky Mountains.

c. Stationary - air masses on both sides of front move parallel to it. Often the warm air moves in the opposite direction of the cold air.

d. Warm - the warm air slides up over the cold air. High wispy clouds which later lower, warn of its approach. Precipitation follows.

e. Cold - the swift-moving cold air mass wedges under a warm air mass and lifts it. Often strong winds and thunderstorms occur.

f. Occluded - the fast-moving cold air mass has overtaken the warm and cool air masses. It restricts the warm air in size and lifts it completely off the ground.

2. Topography

a. Large bodies of water will contribute to moist air.

b. Water warms up more slowly than land but stays warmer longer, thus affecting the surrounding air.

c. Mountains can shield areas from winds or provide passageways between for winds to funnel through.

d. Mountains act as barriers, causing rain shadows.

e. The air is freer of dust particles at higher altitudes, permitting more direct sun rays.

How is weather forecast?

1. Factors involved

a. Direction wind is coming from

b. The wind, or its temporary absence, whether it is steady or changing

c. A variation from normal temperature

d. The amount of moisture in the air

e. Clouds as signals of weather changes

2. Instruments used
    a. Anemometer - measures the speed of wind.
    b. Barometer - measures the air pressure.
    c. Thermometer - measures the rise and fall of heat.
    d. Wind vane - shows the direction the wind is coming from.
    e. Rain Gauge - measures the amount of precipitation.
    f. Hygrometer or psychrometer - measures the amount of moisture in the air.

B. Activities preceding (in the classroom)
1. Make weather instruments: anemometer, barometer, hygrometer, rain gauge, wind vane. (Include a thermometer on a stand.)
2. Map the air currents in the classroom.
3. Make a class book including weather superstitions and drawings.
4. Make a dictionary of weather terms.
5. Make a bulletin board using cotton and charcoal or colored chalk to show the different kinds of clouds.
6. Record on a chart the weather observations for the week before leaving. (Use the class-made instruments.)
7. Make arrangements for a student from another room or a parent to keep the Denver weather report for the week while gone.

C. Activities at the Outdoor Laboratory
1. Make morning and evening weather observations with the class-made instruments.
2. Record observations and readings on a chart.
3. Take notes on any effects of weather, such as bare or forested slopes, soil, etc.
4. Take notes on any unusual changes in the weather throughout the day.

D. Activities following (in the classroom)
1. Make a graph of the weather observations.

2. Compare morning and evening observations with what happened in Denver.

E. Enrichment

Report on why weather at Outdoor Laboratory differs from that of Denver.

F. Draw conclusions

V. EVALUATION

A. Teacher made problem-solving test. Set up situations such as, "If there were cumulus and nimbus clouds, the barometer was falling and the winds changed direction, what would you predict?"

B. Do the children seem more aware of the weather and try their own predictions after the unit is over?

C. Do they use the correct weather terminology in their daily lives?

D. Do they disregard weather superstitions?

VI. RESOURCES

Books:

Blough, Glenn O., *Elementary School Science and How to Teach It*, Dryden, New York, 1952.

Craig, Gerald S., *Science for the Elementary School Teacher*, Ginn and Co., Chicago, 1947.

Tannehill, Ivan, *All About the Weather*, Random House, Inc., 1953.

700 Science Experiments for Everyone, UNESCO Source Book, Doubleday, 1956.

Pamphlets:

Row Peterson Unit Texts: Clouds, Rain and Snow, Ways of the Weather, Ask the Weatherman, Superstition or Science.

World Book Encyclopedia - Unit No. 54.

Boy Scouts Merit Badge Series - Weather.

Films:

#443 Clouds Above
#390 Our Weather
#385 Winds and Their Causes

PROPOSAL FOR PLANTING
TREE SEEDLINGS AND SHRUBS
OUTLINE

Sandra Wolters

OUTLINE

Introduction

I. The importance of obtaining tree seedlings
    A. Develop concept of conservation
    B. Provide activities for children

II. Types of trees and shrubs best suited for the area
    A. Evergreen & deciduous
        1. Colorado Blue Spruce
        2. Limber Pine
        3. Rocky Mountain Juniper
        4. White Fir
    B. Shrubs and Shrubby Trees
        1. Mountain Common Juniper
        2. Mountain Mahogany
        3. Rocky Mountain Alder

III. Location for planting
    A. Description of existing area
    B. Illustration of proposed planting

IV. Procedure for ordering plants
    A. Where to order
    B. Dates of purchases

V. Schedule for school groups
    A. Dates appropriate for planting
    B. Steps in tree planting

Summary

Bibliography

Jefferson County has provided a very worthwhile and outstanding outdoor education laboratory for the sixth grade pupils. At the present time, additions are being made to include a wider range of experiences in the out-of-doors for these children.

Upon visiting the Outdoor Laboratory School, it is obvious that additional emphasis on land conservation should be stressed. The ground around the buildings is in need of such a program. The area has been cleared for the construction of the buildings and consequently has not been replanted to prevent wind and water erosion. The students are not limited entirely to walking paths which accounts for the dusty atmosphere between the cabins and dining hall.

It is, therefore, hoped that the research completed for obtaining and planting seedling trees and shrubs will enable the students to take an active part in improving the present site and help them to realize that the conservation program is a lasting duty of all.

As stated in the text, Philosophy of Outdoor Education[1], "The most serious problem related to natural resources is how to conserve the remaining good natural soils that exist on the earth, together with the complementary resources of forests and other plants, water, and myriads of beneficial forms of animal life."

Children need to understand dangers of future problems to land, and thereby take the necessary steps to prevent such problems. Therefore, the planting of tree seedlings and shrubs around the camp site will provide a worthwhile project for the children while they attend their week at camp, and at the same time help to build future camp security for those sixth graders to follow.

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[1] Freeberg, William H. and Loren E. Taylor, Philosophy of Outdoor Education, Burgess Publishing Company, Minneapolis, Minnesota, 1961, p. 316.

There are many types of trees and shrubs suited for the outdoor education laboratory of Jefferson County. The following descriptions are just a few of the suitable plants for the area. Emphasis will be placed on the particular species for this report.

1. The Colorado Blue Spruce stands transplanting well and will grow almost anywhere if given fairly good soil and even a moderate amount of moisture. The color of this tree ranges from green, to blue, to the much-sought true silver. The blue and silver colors are from a bloom or powder on the needles, which wears off as the season progresses. Therefore, these trees are at their best just after the new growth has first appeared.[1]

2. Limber Pine and Bristle-cone Pine are both typical of the subalpine zone, but are found in the montane zone. They are easily distinguished by their five-needled clusters.[2]

3. The Rocky Mountain Juniper is most frequently found in open stands on hillsides, usually in rather dry situations. The berries are about the size of peas, the bark is scaly, the twigs slender and graceful, and the heartwood is red.[3]

4. The White Fir is a beautiful tree with broad and flat needles. The cones are large and upright. It is found in the montane zone up to 9,000 feet.[4]

5. The Mountain Common Juniper is an evergreen ground-cover with bluish berries. It is found in rocky hills, often among pines. The sharp spreading needles of this species are in whorls.[5]

6. Mountain Mahogany is a drought-resistant medium-high shrub. The leaves are wedge-shaped. This shrub is characteristic with its spirally-twisted, feathery, and dry fruits.[6]

7. The Rocky Mountain Alder is a tree-like shrub with two or more gray-barked trunks. Reddish buds are found on the stalks. The leaves are coarsely-toothed.[7]

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[1] More, Robert E., Colorado Evergreens, The Denver Museum of Natural History, Denver, Colorado, 1949, p. 35.

[2] Pesman, M. Walter, Meet the Natives, The Smith-Brooks Printing Company, Denver, Colorado, 1952, p. 71.

[3] Trees Native to the Forests of Colorado and Wyoming, U.S. Department of Agriculture, Forest Service, Rocky Mountain Region, p. 16.

[4] Pesman, M. Walter, Meet the Natives, The Smith-Brooks Printing Company, Denver, Colorado, 1952, p. 71

[5] Ibid, p. 75.

[6] Ibid, p. 73.

[7] Ibid, p. 72.

Since orders must be sold in multiples of twenty-five or fifty of each species, it is advisable to concentrate on a few at a time. For the area near the laboratory buildings, Limber Pine, Mountain Common Juniper, Mountain Mahogany, and Rocky Mountain Juniper are suggested.

As previously stated, the grounds around the buildings are in great need of plant life. Not only will this assist in the conservation program, but it will also improve the appearance of the area.

The Maintenance Cabin and Commons building is the most functional meeting place at the camp site. At times, animals are even fed behind the building. There are no plants surrounding this structure.. It is, therefore, suggested that the evergreen ground-cover of the Mountain Common Juniper be planted around the three most visible sides. On the back side where the animals are fed, a row of Common Juniper near the building, and a row of Rocky Mountain Juniper on the slope directly behind the building would provide an adequate ground covering and shelter.

The need for plants is evident around the new cabin #4. This cabin is located near the Commons house. Between the two structures is a vast area of open space. For the area around Cabin #4, Mountain Mahogany is suggested. In the open area between the buildings, Limber Pine could be planted. Not only would this addition improve the appearance and eliminate much of the dust condition, but it would tend to make a natural barrier for unnecessary trespassing by the campers.

North of the main lodge and west of the showers, there is an upgrade that is slowly wearing away due to people straying from the intended pathway. Some of the camp directors have suggested that Limber Pine would make an ideal tree for this area.

An illustration of this proposed plan will follow.* There are definitely other areas needing attention, but due to the time and expense involved, it would be best to concentrate on one particular area to begin such a project.

Order blanks for obtaining tree seedlings and shrubs may be obtained by writing to the Colorado State Forest Service, c/o Thomas B. Borden, State Forester, Colorado State University, Fort Collins, Colorado. Mr. Stanley H. Stolte of the County Extension Office in Golden, Colorado, can also provide this information.

The prices of the tree seedlings and shrubs vary, but is nominal for the actual value of the purchase. Potted evergreens are not sold in lots of less than multiples of twenty-five per species. Most of the shrubs and larger tree seedlings are sold in multiples of fifty or one hundred per species.

Orders should be made before March to insure obtaining the proper amount and species. Shipments are made between March 1 and May 15.

Because of the shipment dates from Fort Collins, the planting of the tree seedlings and shrubs will be a spring project for school groups.

There are many ways that this program can fit into the weeks' curriculum at camp, but the procedures will probably vary according to the interest instilled in each group participating.

For example, one group may want to concentrate on planting the various species around a particular building. The next group to attend the camp may work on a different area. Such a system would continue until the area project had been completed.

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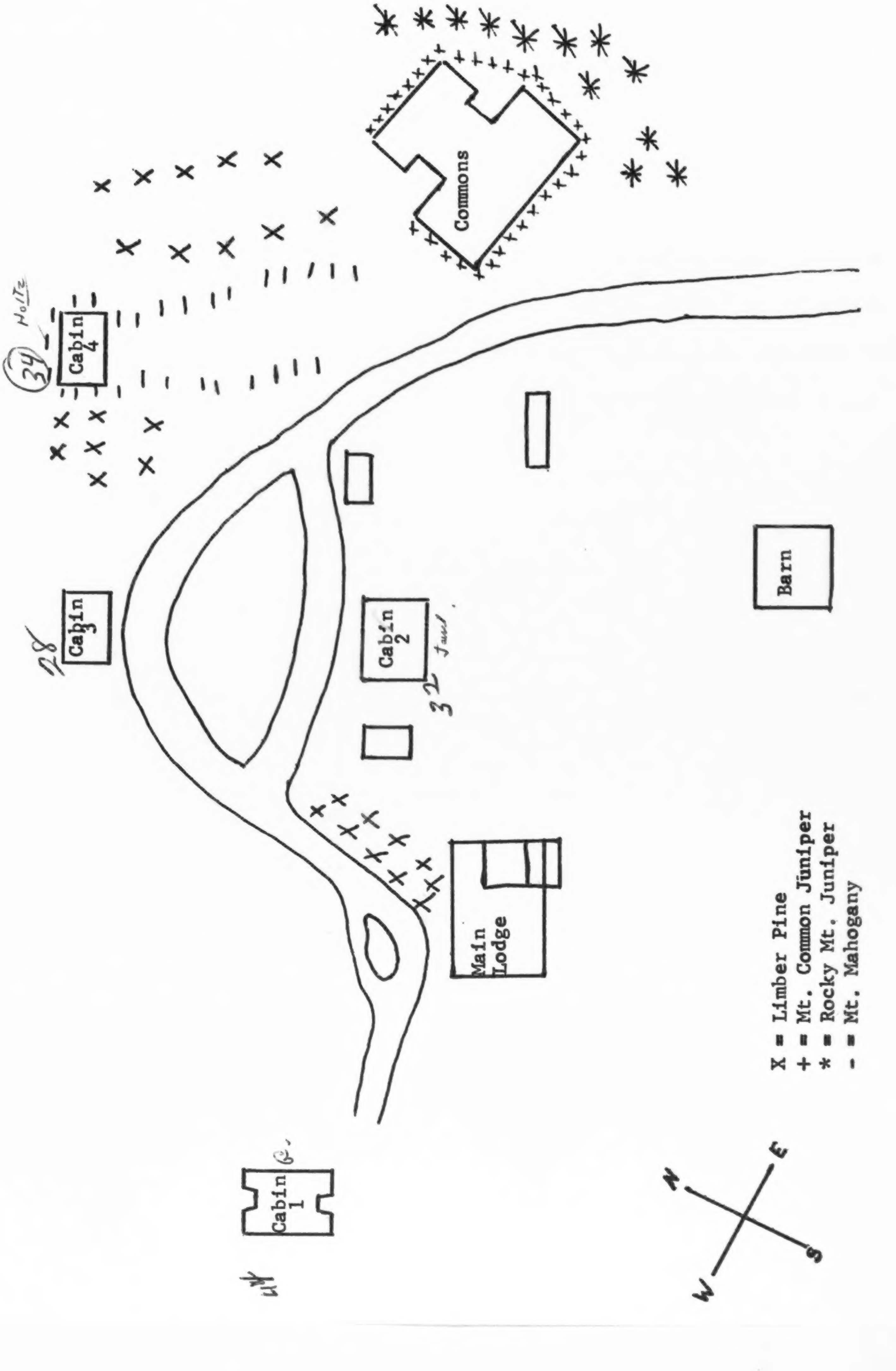
*See attached drawing supplement on the following page.


Commons
Cabin 4
Holtz
(34)
Cabin 3
28
Cabin 2
32
Barn
Main Lodge
Cabin 1
G.
44
X = Limber Pine
+ = Mt. Common Juniper
* = Rocky Mt. Juniper
- = Mt. Mahogany
N
E
S
W

If the evaluation of this program was in favor of continuing the project, areas beyond the immediate building locations could be emphasized.

The children could be prepared before arriving at the camp on the proper steps to follow in actually planting the tree seedlings or shrubs, since it would vary with different species.

Conservation is essential for maintaining educational and recreational areas. If the students have an opportunity to be a part of a living project, they will be better prepared for becoming responsible citizens of tomorrow. In addition, they will be making an important contribution to the Jefferson County Outdoor Laboratory School.

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Pesman, M. Walter, Meet the Natives, The Smith-Brooks Printing Company, Denver, Colorado, 1952.

Others:

"Trees Native to the Forest of Colorado and Wyoming," U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.

"Tentative Outdoor Education Curriculum Guide," Jefferson County Public Schools, Lakewood, Colorado.

RECREATION

Every effort is made to fully utilize the wonderful natural out-of-doors environment at the Laboratory School. Games and other activities have been selected in keeping with the school site and facilities.

HERE'S HOW YOU TOSS A RINGER

OUTDOOR SKILLS

The Rocky Mountain Trail Association is developing new trails in this area which will lead mainly east and west. These trails will give citizens new accessibility to many hundreds of peaks, lakes and streams in which the outdoorsman will find peaceful wilderness, better hunting, fishing, camping and the many other pleasures which nature provides.

The outdoor school is the natural locale where young citizens may be equipped with knowledge and skills to better appreciate and enjoy the abundant natural resources in this area.

I. Outdoor Survival - what to do if lost.

  A. Mental attitude - panic is the major problem to those who become separated or lost.
    1. Stop, sit down and try to figure out where you are. Use your head, not your legs.
    2. Take everything out of your pockets and assess your resources. This has a twofold purpose:
      a. The individual concentrates on something other than being lost.
      b. He may realize he has something to aid his safe return to civilization.
    3. Remember there is nothing to be afraid of in the outdoors.
      a. Do not fear wild animals.
      b. Keep calm and help others find you by
        (1) Marking your trail.
        (2) Carving in a tree the date, your initials, and an arrow pointing your direction of travel.
        (3) Use rocks, sticks or twisted grass to mark trail.

  B. Do not wander about aimlessly.
    1. Pick two objects in the distance--one immediately beyond the other, in the direction you plan to travel.
    2. Move only downhill and downstream. Ask for discussion of the term downstream.
    3. In extremely cold weather, keep moving to aid circulation. Hint: Pick out tree or rock and walk around it very slowly.

  C. Before nightfall, make shelter if weather dictates.
    1. Snow cave - made by digging with hands or stick into snow bank for wind protection.
    2. Lean-to - place brush tops against fallen trees or rocks.

  D. In case of electrical storm
    1. Head for low elevations.
    2. Get close to the ground by squatting on heels; do not sit or lie down.

  3. Stay away from power lines, tall trees, rocks.
  4. Remove any metal objects such as watches, rings.
  5. Grove of green aspen at lower elevation is fairly safe.
  6. Stay away from standing or running water.

E. If injured, choose a clear spot on a mountain spur and
  1. Make a smoke signal (covered in section on fire building).
  2. Put some marker such as light colored or bright clothing on a stick to attract attention.

F. When lost, water is usually of more importance than food.
  1. In a mountain area, moving water is usually safe to drink. Hint: Just because animals drink from pools does not mean the water is safe. Example: stagnant pond.
  2. Melt snow before eating to keep from chilling.
  3. Eat no mushrooms. Note to teacher: 98% of mushrooms are edible, 2% are deadly poisonous and it is difficult to teach younsters to identify the different types.
  4. Eat only black berries, no red or white berries.
  5. The roots of pine trees are nourishing.

G. Don't run, don't yell, don't worry and, above all, don't quit.

H. Summary
  1. KEEP CALM.
  2. TRAVEL IN DAYLIGHT ONLY--DOWNHILL AND DOWNSTREAM.
  3. MARK YOUR TRAIL
  4. NEVER GIVE UP!!

II. Tobogganing and Saucering

A. Require little skill and result in wholesome, exhilerating fun.
B. Could be incorporated into the schedule as weather and time permits.
C. Should have one session to discuss proper procedures for mounting on toboggan.
  1. Front man digs heels in to act as brake while loading
  2. Anchor man gives shove as he sits down
  3. To change direction lean into turn
D. Safety Rules
  1. Keep hands and feet from under toboggan
  2. Watch for obstacles in your path
  3. Do not jump off while moving downhill
E. Follow sections C and D for saucering. Saucering is an individual activity while tobogganning is a group effort.

HIKING

" . . . . walking is not only a joy in itself, but . . . it gives an intimacy with the sacred things and the primal things of earth that are not revealed to those who rush by on wheels."

I. Your Hiking Outfit

  A. Hiking clothes should be comfortable and well-fitted
  B. In cold weather, the hiker should wear several layers of light clothing rather than one heavy garment.
  C. Shoes should be broken in, of the lace type, and sturdy

II. How to Walk

  A. Leader should set comfortable pace to allow for observation
  B. Toes should be pointed straight ahead; brush heel lightly and push off with your toes; lean forward from your hips; keep your chin up; arms should swing easily and naturally at your sides.
  C. Breathe rhythmically through your nose to prevent dry, sore throat and chapped lips.
  D. Rest three to five minutes every half hour or so and no longer or muscles may become stiff; lie down with legs up against a stump; when time is up, continue at same pace.
  E. When stopping for short "breathers", face down the slope to relieve leg strain.

III. Trail Courtesy

  A. Remain quiet when looking for animals
  B. Teach conservation of plant and animal life
  C. Leave gates and fences as you found them; obey posted signs

IV. Trail Safety

  A. Do not throw or dislodge rocks - danger of hitting hikers on trail below you.
  B. Do not allow swinging twigs or limbs to brush into the face of the hiker trailing you.
  C. Place feet on solid ground, step over loose rocks and logs.
  D. When using trees or shrubs for handhold, be sure they are sound.
  E. Stay with your group - do not stray off by yourself.

CAMPFIRE WARMS FELLOWSHIPS

II. Fire Building and Fire Safety

In outdoor living a good fire has many uses--for warmth, for cooking food, for smoke signals, for burning trash and for lifting camp spirit.

Four rules which should always be remembered when building fires are:

1. Build a fire only in a safe and adequate place, where it can be kept under control. Remove all dead leaves, bits of rotted wood and debris down to the mineral layer. Do not build a fire under a tree; a green tree might be killed from the heat and a dead tree catches fire easily.
2. Build a fire large enough for the need, but small enough for safety and control.
3. Keep the fire under control at all times. Keep water and spade handy and keep flammable materials at a safe distance.
4. Extinguish the fire when it is no longer needed. Leave it only when it is cold. Use lots of water.

A. Fire building procedure

1. Choose a safe place.
   a. Use a ditch, hole in the dirt, a flat rock or sheet metal for a base.

b. Build the fire with the wind at the builder's back.
c. Keep at least ten feet of area on all sides of the fire in which there are no flammable materials.

2. What to burn
   a. Tinder: shavings, sticks, small twigs, thin pieces of bark.
   b. Kindling: match size to thumb size, dead branches, split pieces from larger wood.
   c. Fuel: kindling size to logs, softwood for hot, quick fire, hardwood for slow fire and longer lasting coals.
      (1) Softwood - pine, spruce, gray birch, aspen (fast growing trees).
      (2) Hardwood - oak, hickory, maple, ash (slow growing trees).
3. Starter fire (foundation)
   a. Build the fire with wind at the builder's back.
   b. Place two or three sticks of kindling at right angles; place tinder under this.
   c. Place two or three sticks of kindling loosely.
   d. Light; as flame catches and spreads, add more kindling from small to large.
   e. When fire is burning well, add other fuel.
4. Develop the fire needed for the particular purpose.
   a. Tepee fire - quick, hot fire for boiling or starter for another type fire. Begin with foundation fire and build up in wigwam style.

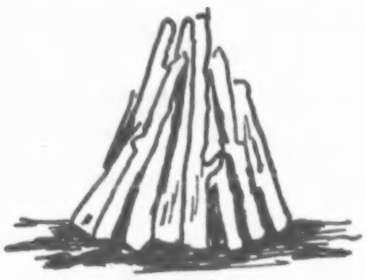


Figure 1

b. Criss-cross fire - solid fire burning to uniform bed of coals. Start with foundation fire and add sticks; sometimes called Log Cabin Fire. Large size may be used for Council Fire, it gives excellent light.

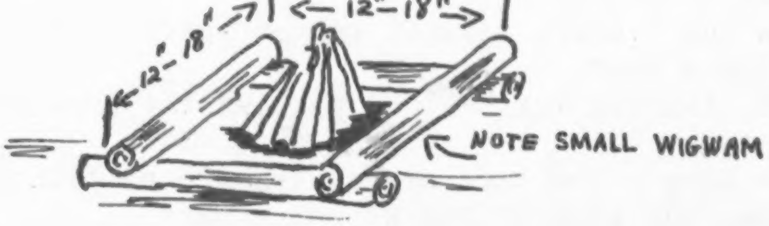


Figure 2

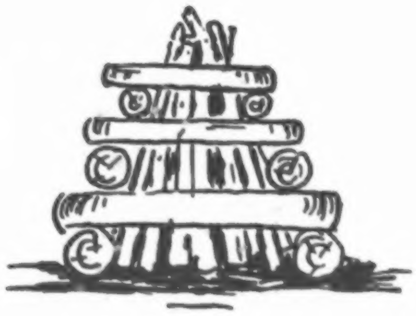


Figure 3

c. Star or Indian Fire - for warmth. Initial tepee style fire into which long sticks or logs are pushed. A lasting fire for evening heat.

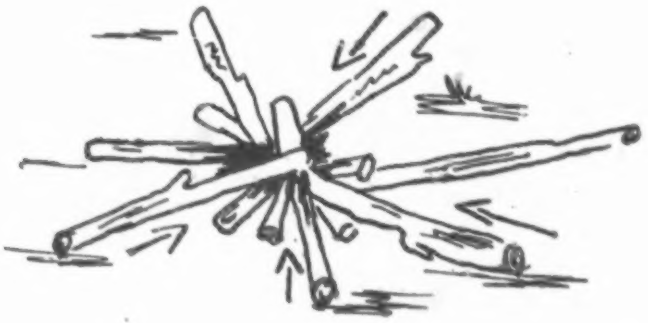


Figure 4

B. Fire Safety
   1. Use fireplaces to keep fires under control.
   2. Build small fires.
   3. If windy, build a fire in a ditch.
   4. Never play with fire.
   5. Clear the ground around the fire and the branches above it.
   6. Never leave a fire without someone to watch it.
   7. Always have sand, water and a shovel handy.

III. Knot Tying

Tying knots is one activity that is learned early in life. From his first pair of shoes to joining two jump ropes together, a youngster uses the skill of tying. Using the backdrop of the outdoor education school, knotcraft is taught in order to familiarize the students with simple yet effective knots. There is a definite satisfaction which comes from making a secure knot when it is needed.

A. Equipment - two lengths of rope, not string or twine, about six feet long, one quarter inch or larger in diameter. A rope has these parts:
   1. The End - short part of rope or part used to lead when tying a knot.
   2. The Standing Part - long part of the rope or the inactive part.
   3. The Loop - the turn or circle made by bringing the end along the side of the standing part.
   4. The Bight - a loop converted into a bit by bringing the end over or under the standing part.

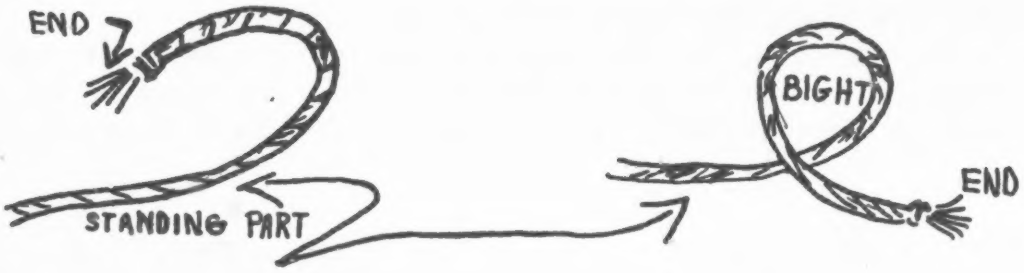
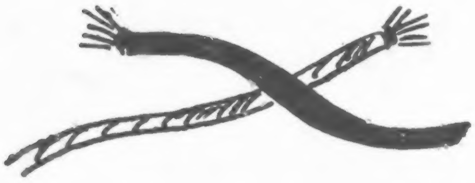


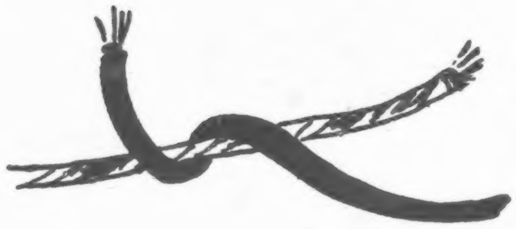
Figure 5

B. Knots for Joining Ropes

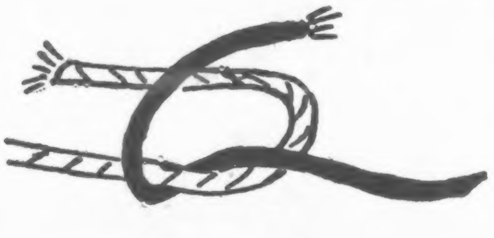
1. Reef or Square Knot
   Purpose: Tie equal size ropes or string together, to tie packages, shoe strings or bandages.



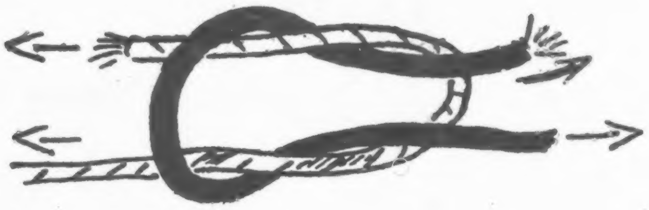
Take one end of each rope in either hand.



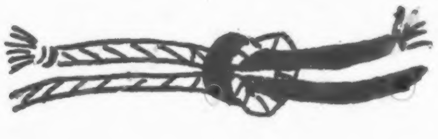
Cross right end over that held in left, twist back, down, and up in front, so that a single knot is made. End started with is now in left hand.



Take end in right hand, bend it over to left, so it makes a loop and lies along knot already made.



The other end (in left hand) has only one place to go and that is into the loop.



Take hold of knot in both sides and tighten by pulling in opposite directions.

Figure 6

2. Sheet Bend Knot

Purpose: to join two ropes of unequal thickness.
Make a square knot (1) but take the end of the smaller rope A and cross it under the other piece of the same rope at B, and then up and over the bigger rope at C, (2). This will hold.

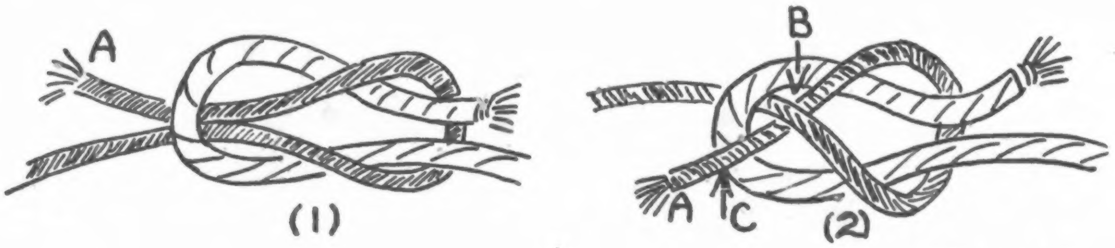


Figure 7

C. Knots for Tying a Rope to an Object

1. Clove Hitch

Purpose: to fasten a rope simply and quickly around a post, spar or stake.
End A is brought around tree and crossed over own standing part, B, then around the tree and under the bend just made.

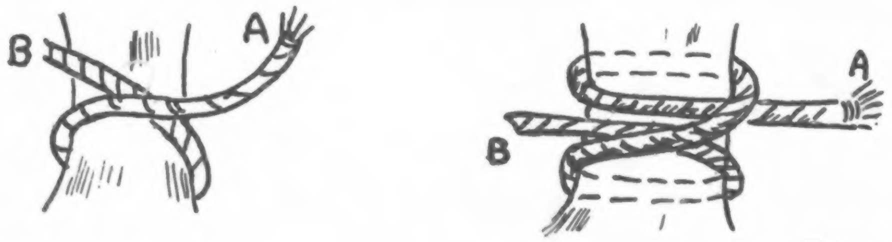


Figure 8

2. Half Hitch and Two Half Hitches

Purpose: to tie a reliable and quick fastening for a boat mooring or any other object with a right-angle pull.

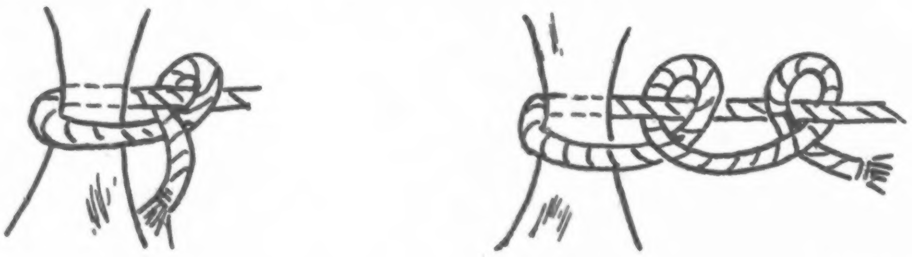
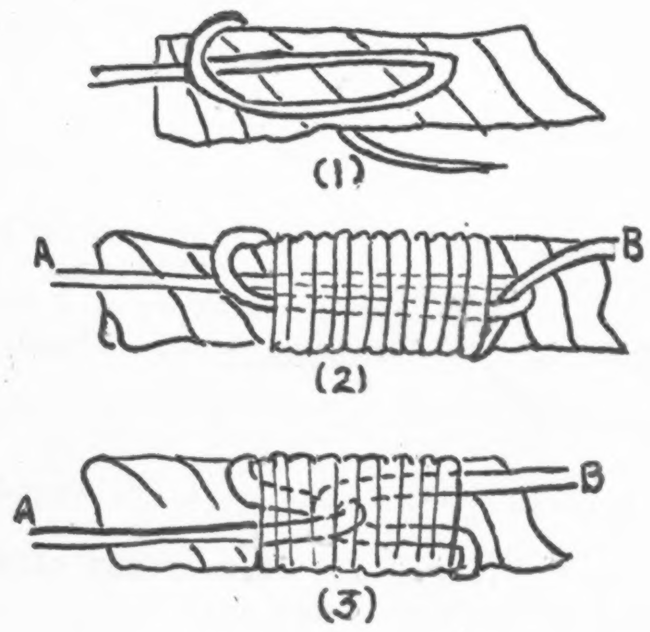


Figure 9

D. To Keep Ends from Raveling

Whipping

Purpose: to keep the ends of rope from raveling. Use a fine yarn marline or spun yarn for the whipping.



Place the end of yarn at end of rope and lay loop along the rope. (1)

Wind the yarn tightly around both loop and rope, thus binding them together. Wind distance roughly equal to the diameter of the rope being whipped (2). Place winding end B through the loop (2). Pull end A tight until loop is drawn back out of sight. (3)

Figure 10

III. NAVIGATION

A. A Topographic Map - may be obtained from Map Information Office, U.S. Geological Survery, Washington 25, D.C. Request a topographic map index circular of the state you will hike in and a free folder describing a topographic map.

1. Topographic maps come in different scales. A good scale for a hike map is 1 inch to 24,000 inches. This would appear on the map 1:24000. I inch would be equal to 2,000 feet or slightly less than one half mile.
2. Map Symbols - locate map symbols
    - a. Everything printed in black is work of man
    - b. Everything printed in blue is water
    - c. Everything printed in green is woodland
    - d. Everything printed in brown is a hill or valley
3. Contour Interval or Lines
    - a. Extremely important as they tell hiker elevation above sea level
    - b. The closer the lines the steeper the hike
    - c. When lines are together a cliff is indicated
4. Using the Map
    - a. Spread out map and start from a point familiar to you
    - b. Next decide your destination
    - c. Measure distance by laying strip of paper on map with one edge along your route, mark starting and destination points on paper, then place paper strip on ruler at bottom of map.
5. Orient your Map by Inspection
    - a. Study surroundings for outstanding landmark that will be shown on your map.
    - b. Turn map until line from spot on map where you are standing to map symbol that indicated landmark lies in same direction as line from your actual position to actual landmark. Now North of map is true North - All directions are correct.
    - c. After finishing first lap of trip, bring out map and orient again and so on until you reach your destination.

RECREATIONAL ACTIVITIES

There should be a certain amount of time in each day when the youngsters are involved in activities for the purpose of having fun. Physical relaxation follows mental relaxation. All of these activities should be supervised - some directly, others indirectly - but always supervised.

I. Quiet Games

A. If inclement weather prevails for a long period of time, inside activity may be necessary.

B. Quiet games may be in order when children are excessively tired from hikes and other strenuous activities, such as:

1. Right and Left Spelling

Equipment: None

Formation: The players stand in line as for a spelling match, or they may be seated and spell around the circle, or they may be divided into teams. The leader stands where all players may see and hear clearly.

Rules of the Game: The leader announces that the letters "A" and "T" must not be said aloud but that "A" is to be indicated by raising the right hand, and "T" by raising the left. For example, the word "CAT" would be spelled thus; C pronounced, right hand raised, left hand raised. In giving out the words for spelling, the leader selects those containing as many "A's" and "T's" as possible.

Art
Fat
That
Battle
State
Saturday
Plantation
Atlanta
Bat
Hat
Attack
Attract
Taste
Material
Matter

Those who miss drop out.

With a group of players who have become expert, a more complicated system may be used, as follows:

A - raise the right hand
I - touch the eye
R - whistle
E - raise left hand
U - point to leader
S - shake the head

Variation: One player would spell a word he selected using movements above and the other players would guess the word. If teams are used, each member of one team would spell one word in a sentence and the other teams would guess the sentence. Then another team would have a turn.

2. A Trip through a Department Store

Equipment: None

Formation: The children are seated anywhere in the room with a clear view of the leader.

Rules of the Game: The leader tells a story of an imaginary trip he took through a department store where he wanted to purchase a number of articles. First he purchased a pair of scissors which he demonstrates by opening and closing the first and second fingers of his right hand as one would a pair of scissors. The players do the same. Next he purchased a fan (everyone waves a fan with the left hand). Being thirsty, but finding no water, he purchased a package of chewing gum (everyone chews). Next the leader noticed a woman giving a demonstration of the art of running a sewing machine (all the guests pedal the machine with both feet). A very persistent sales-person tried to sell him an article that he didn't want and he shook his head and refused (all players shake their heads in refusal). Then the leader became quite tired, so he went down to the furniture department, seated himself in a rocking chair and rocked (all rock in their chairs) until his feet were rested; then he went home. When he got in the door he was so relieved he gave a shout of joy - "Hurrah" (everybody shouts "Hurrah").

Note: Each new movement is added on to the preceeding one. At the end of the trip the players should be doing all the movements at the same time.

3. Heads Down, Thumbs Up

Equipment: None

Formation: The children are seated with seven standing at the front of the room.

Rules of the Game: The leader (teacher or student) calls out, "heads down, thumbs up!" The children put their heads down, close their eyes, and hold up one thumb. The seven at the front walk quietly and quickly and each one touches a thumb and returns to the front. The leader then calls out, "heads up, thumbs down!" The seven children who were touched are asked to stand and try to guess which child touched his thumb. If successful in guessing the right one, he changes places with the one at the front. If not, he remains in his seat. Begin again.

4. Snap Words

Equipment: Set of one or more alphabet cards (letters printed on pieces of cardboard).

Formation: The children are seated in a semi-circle with the leader standing at the front.

Rules of the Game: The leader (teacher or student) holds a set of alphabet cards. The cards are well mixed and face down. A class of words such as "birds" is selected. As the leader displays individual letters, the players call out the name of the bird. The player who first responds with a name beginning with the letter on the card, receives the card. If no one responds in five seconds, the card is returned to the bottom of the pile and the next card is displayed. This is continued until the players hold all the cards. Player with the most cards wins.

Other Word Classes: Vegetables, fruit, cities, rocks, animals.

5. Fruit Basket Upset

Equipment: None

Formation: Players are in a circle, "It" is in the center of the circle.

Rules of the Game: The teacher of "It" goes around the circle giving each player, "It" included, the name of a fruit:

Apple
Plum
Pear
Peach
Grape
Banana
Orange
Strawberry
Cherry

"It" calls the name of a fruit and the two or three people with that name exchange places as "It" tries to get a place in the circle. The person without a place is "It". If "It" would like everyone to change, he calls, "Fruit Basket Upset", and everyone must change places at once.

6. Hokey Pokey

Equipment: None

Formation: Players are in a circle, all facing center. Designate a leader.

Rules of the Game: All sing and pantomine as words indicate:

You put your left hand in
You put your left hand out
You put your left hand in
And you shake it all about
You do the Hokey Pokey
And turn yourself around
That's what it's all about.

Begin again inserting the following:

Right hand
Left leg
Right leg
Left hip
Right hip
Left shoulder
Right shoulder
Head
Whole body

7. Fire in the Mountain

Equipment: None

Formation: All the players except one form a double circle facing inward, each in the outer circle standing directly behind his partner. The extra player, who is "It", stands in the center.

Rules of the Game: When "It" calls, "Fire in the Mountain! Run, Men, run!", the players in the outside circle begin immediately to jog around while "It" and the players of the inside circle clap their hands. When "It" stops clapping, he and the inside players hold their hands over their heads as a signal that the outside players are each to try to get in front of the inside player. "It" tries to do the same, and the player left out becomes "It" for the next time.

These are examples of a few activities. Resource material is available in the main lodge.

CAUTION: Quiet games have a definite purpose and should not be used as a time filler at the outdoor school except in emergencies.

Scavenger Hunt

A list of suggested items for a scavenger hunt at the Laboratory School.

1. Seed body from Mountain Mahogany
2. Set of needles (not a branch) from the Limber Pine
3. Berry fron Kinninikinnick
4. Four different kinds of live insects.
5. Small piece of Rose Quartz
6. Rabbit Droppings
7. Deer Droppings
8. A piece of Timothy Grass
9. Blue Grama
10. One Wild Raspberry leaf
11. Douglas Fir cone
12. A small piece of a spreading Juniper
13. Englemann Sprice cone
14. Ponderosa Pine cone
15. A small piece of Gneiss (pronounced "nice")
16. A Goll
17. A bird feather
18. A rock with the slimy plants on it (Plants are possible Liverworts.)
19. Small branch of a Wild Rose plant
20. Sand houses of small water insects
21. Indian tobacco or dock
22. Yarrow
23. Mushroom
24. Something which shows evidence of bacteria at work

GOOD OL' MOUNTAIN MUSIC

3

II. Evening Recreation

A. For relaxation in the evening, there should be a recreational period of thirty to forty-five minutes following the last evening class. The following activities have been suggested because of limited time and space.
   1. Skit Night
   2. Charades - substitute new signals and the names of flora and fauna for songs, books, and movies
   3. Songfest - a camp song book is available at the site
   4. Talent show
   5. Square dancing
   6. Campfire program

B. To motivate camp spirit, contests in some of the above areas may be organized among dormitories or camp groups.

III. Singing at Mealtime

A. Group singing tends to draw the students together and creates a happy, relaxed atmosphere at the outdoor school.
   1. Singing should begin only after students have finished eating
   2. After meals, five to ten minutes of singing is sufficient
   3. A competent leader with a repertoire of witty songs and catching melodies should be in charge of the singing.
   4. Songbooks are not necessary as this is an appropriate time for short, easy to learn, novelty songs. The leader may use the camp songbooks as reference in preparing for these short sessions.

B. A singing camp is a happy camp.

SUGGESTED WORK PROJECTS FOR IMPROVING THE SITE

A purposeful work program is an integral part of the Outdoor Education Laboratory School curriculum. Projects may be of two general kinds: those which are of benefit to the immediate classes, and those which benefit future groups.

The following is a partial list of projects for consideration. A suggestion box is available at the Laboratory School for teachers to give their ideas for additional projects.

1. Building bird feeding stations and bath.
2. Improving the existing nature and compass trails and adding others.
3. Improving and installing permanent outdoor markers for trails.
4. Making and installing permanent outdoor markers for particularly good specimens of trees, rocks, etc.
5. Building brush shelters at strategic points
6. Constructing specific exhibits of various kinds (rocks, trees, other plants, insects, etc.) to be a part of the museum. Adding interesting specimens to the museum.
7. Making plaster casts of animal tracks to be displayed in the museum.
8. Planting of trees.
9. Erosin control.

POST EDUCATIONAL ACTIVITIES

Post educational activities bring the student back to the classroom with a broader concept and understanding of the knowledges learned and a great desire for further study. The student needs help in organizing his knowledge and experience in a meaningful fashion. Post outdoor education activities should plan for this organization through individual work, discussion groups, and an evaluation of the week at the laboratory school.

Suggestions for Post Educational Activities

Class Science book including descriptions of rocks found, plants identified, trees identified, etc.

Class dictionary of new terms learned from this experience (use drawings and illustrations when possible)

Exhibit table

Mural - depicting each life zone and including flora and fauna
- showing inside of fire lookout

Dramatization - plays

Review of principals of conservation taught and observed at camp and follow up with identification of the meaning of conservation to home community

Reports - effects of fire, floods, erosion, etc.
- balance of nature
- unusual experience or happiest experience

Tracing the flow water flow Corral Creek to the Gulf of Mexico

Exploring to see what can be done about conservation around the community

School newspaper or summary of work through publication of findings in paper form - include sketches

Completion of evaluation

Pupil Evaluation

Self Evaluation

1. Did I participate in both the planning and the activities?
2. Did I make my observations carefully and accurately?
3. Was I careful not to destroy anything and leave the site as I found it?

4. Did I gather only specimens that were in abundance and without damaging anything?
5. Did I cooperate with the others and do my share of the duties?
6. What part of the outdoor education program did I enjoy most?
7. What did I learn about my classmates that helped me know them better?
8. Of what use is the "out-of-doors" to me?
9. What can I do to help preserve the "out-of-doors" for use in the future?

Group Evaluation

1. What did we gain from this experience?
2. What can we do to help preserve the out-of-doors for use in the future?
3. What problems did we encounter and what improvements would we make if we were going again?
4. In what way did we improve the grounds or buildings of the laboratory school?

The student evaluates the entire experience in the light of his own purposes.

Teacher's evaluation

Of own work

1. Did my pre-planning result in the learning experiences hoped for at the outdoor education laboratory school? (see objectives)
2. Was I able to communicate desirable concepts to the children?
3. What did our program lack?
4. How could I improve it?

Of the child

1. Does he wait until he has gathered sufficient evidence before drawing conclusions?
2. Does he show awareness that all things in nature are constantly changing?
3. Does he show an increase in scientific vocabulary based on an understanding of the underlying concepts?
4. Has he developed in self-reliance and cooperation
5. Does he appreciate the great heritage which is his?
6. Does he understand his responsibility in conserving the natural resources?
7. Does he have an understanding of the concepts of wise resource management?

Education is the process by which man strives to organize knowledge and experience in a way that it has meaning for him. This is also true as the child's own interpretation of the meaning and value of what he does in the program is an important part of his learning and development. As children are allowed to set-up their own objectives, they learn to make judgments. As judgments are developed, they can appraise their own progress - determine the extent to which they have achieved their goals - learning then becomes significant.

PART V

Related Information

This material provides information for teachers who wish to enrich the Core Program. They should feel free to use it in any way the philosophy and objectives of the Outdoor Education Program may be further implemented.

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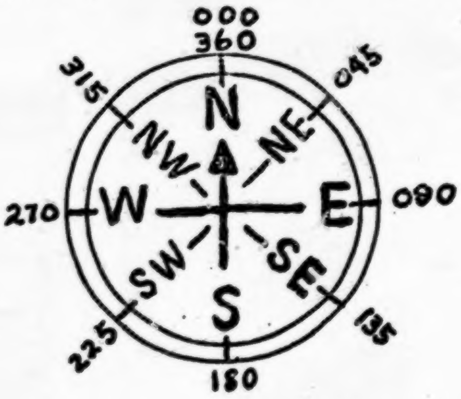
THE COMPASS

Study of the compass is very important for anyone who is going to do any hiking through forests, over mountains, or across desert lands.

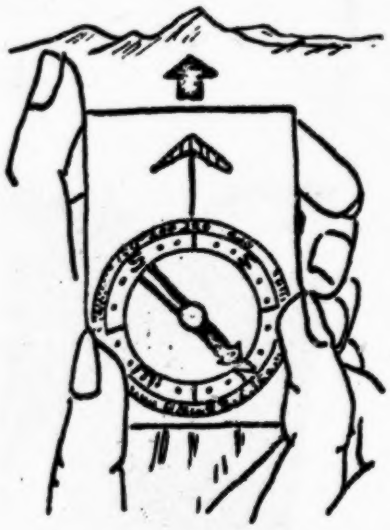
The cardinal directional points of the compass are North, East, South, and West. The in-between points are North-east, South-east, South-west, and North-west. On the compass case you will find marked the 360 degrees of a circle. These degrees are used to find directions. Since you have 360 degrees, East becomes 90 degrees, South becomes 180 degrees, and West becomes 270 degrees.



There are three main purposes for which you can use the compass without the additional help of a map.

1. Finding directions or obtaining one's bearing:

Let us assume that you are standing on an open spot and want to know the directions or "bearings" to a distant hilltop or protruding rock. You face squarely the direction you want to determine, and hold your compass steady in front of you in one hand. Aim the direction arrow at the landmark. With the other hand, twist the case until its North marker lies under the needle North. Read your degrees at the arrow or direction line. You now have the direction toward the landmark.



2. Following a direction with the compass:

Let's say that you want to explore the distant hilltop which you can see from the location where you are standing, and decide to reach it by traveling cross-country through the trees and over the hills. Determine the bearing of your destination as described above. Let's imagine your azimuth or "the way" is 140 degrees. It is best to jot that number down, because sooner or later you may start to wonder whether you remember it correctly.

You start walking toward your destination. At first this is easy. You see it right there in front of you. Soon it will be hidden from view because of trees or land formations between you and your desired destination. The direction in which you have to travel by compass is 140 degrees. Hold the compass in the palm of your hand with the compass housing turned in such a way that the needle rests on the North line. Follow the arrow at 140 degrees. It is wise to notice a prominent land mark in that direction and walk to it. When you reach the landmark, pick out another one and continue to do this until you reach your desired destination.

3. Returning to original location:

After you have finished exploring your original destination, you will want to return to the area with which you are familiar. You traveled out in the direction of 140 degrees. To determine the bearing of your return direction, you add 180 degrees (one-half of 360). If the number of degrees of your original direction had been larger than 180 degrees, you would have subtracted from it rather than adding. In the case of your imagined trip, the 140 degrees plus 180 degrees gives us 320 degrees for your return. You better jot it down and then set out for the original location.

GROUND WATER TABLE

Ordinarily when we think of the part water plays in our lives we think first of rivers, lakes, oceans, and perhaps rain and the city water works. Few ever think of the vast amount of underground moisture stored away deep in the soil. The simplest way to define the Ground Water Table is to say it is the underground water supply to which people dig when they need a well.

Scientists have discovered that the underground water table gets its supply from the moisture which falls on the surface of the land in the form of rain or snow. If the water from rains or melted snow runs off the surface of the land too fast, it does not have a chance to soak into the ground. Anything that speeds the "run-off" therefore, robs the underground water table of its normal supply. This moisture must make its way slowly down into the soil until it comes to a stratum of rock or impervious clay and can go no farther. There it is held in storage for the many uses which nature requires. As moisture, thus absorbed, increases in quantity, the surface of the water table rises just as the surface of the water rises in a tub when more water is added. If it falls it is a sign that the new supply of moisture has, for some r reason, been prevented from working its way down through the soil.

In earlier years, marshes were drained, forest land cleared, and range land overgrazed. This activity destroyed the ground cover which held the water so it could soak into the soil. This, in turn, caused the water table to fall so low that wells went dry, little creeks and rivers would dry up in the summer, and springs, which used to flow from the ground at the bottom of a hill, stopped flowing except in very wet weather. After study, it was discovered that our forests and underbrush, our prairies with a good cover crop of grass was the secret to the level of the under ground water table.

When the underground water table drops too low, it brings much difficulty on man. However, lack of knowledge of the laws of nature caused it in the first place. Man was not the only one to suffer. With the same act which destroyed his farm, he robbed wildlife, such as songbirds, fish, wild ducks, geese, and fur-bearing animals of their natural homes. They could not multiply when their natural homes were destroyed.

Man is learning, by experience and study, how to work with nature and the laws of nature rather than to work against them.

HIBERNATION AND ESTIVATION

Hibernation -- Winter Sleep

Hibernation is common to many groups of animals. Numerous insects, snails, amphibians and reptiles, as well as mammals meet the rigors of the winter season by becoming torpid and thus insensible to the cold. The phonomena of hibernation has been studied by many scientists but we do not yet fully understand it.

There are various factors responsible for this death-like sleep, but one observation is evident. In order to hibernate, an animal must be fat. The more torpid an animal becomes, the thicker the layer of fat which guards its body. Those which fail to gather this protective coat often remain astir well into the winter and frequently die before they can prepare for the long winter sleep.

There are profound phsiological changes that take place in the body of a hibernating animal. The body temperature of the animal drops to that of its surroundings. Animals breathe very slowly. A hibernating jumping mouse may show no indication of breathing for several minutes. The heart beats very slowly also. If a toe of a winter sleeper such as a bat be cut off during hibernation, it scarcely bleeds at all. This is indication of the reduced circulation.

Immediately prior to the hibernation period, the animals that engage in winter sleep appear to eat no food. Many animals purge out their intestines before they become torpid. Since the confirmed hibernators store no food other than a layer of fat on their bodies, they emerge from their winter quarters much thinner for their winter's fast. Many animals lose from thirty to fifty percent of their weight during the four or five month winter sleep. Animals that hibernate are chiefly those that eat plants.

Estivation -- Summer Sleep

This is a sleep similar to hibernation, but it occurs during the summer months. Animals that pass the hottest season in a torpid condition seem to do so to escape from the shortage of the food supply brought about by the absence of water and the desiccation of the vegetation. Through the long dry spells many animals estivate. Sometimes they become active if a rainstorm occurs, but they return to sleep as soon as the moisture is gone.

There is yet a great deal to be learned regarding the winter sleep of all animals. Much can be discovered by the young naturalist with little training but with an inherent curiosity. Such a student could watch ground squirrels that inhabit many of our states. When do they disappear in the fall? What are the dates of emergence in the spring? Is there any winter activity of various species during the mild spells? Little is known of the hibernating sites of turtles, frogs, and snakes. Students should be encouraged to observe and study the habits of these animals.

THE BOTANY SLANT

Contributed by Dr. E. H. Brunquist
Denver Museum of Natural History

There are many different approaches to plants, and no one of them the "best" one, probably. Today, as an example, let's divide the plants of the Outdoor Education School region into four groups, on the basis of the length of time each group has been on the earth without having changed much.

The study of fossils has made it possible for scientists to estimate approximately how early in the history of the earth the different types of plants first appeared.

For today, at least, we can conveniently divide the plants immediately around the Outdoor Laboratory School into the following four kinds:

a) One celled, microscopic plants which were among the earth's oldest settlers, because their ancestors first appeared more than a thousand million years ago. A thousand million years is a billion years, you know. We are including in this group Algae and Bacteria.

We would need a microscope to see a single bacterium, of course. However, we may be sure that millions of bacteria are at work in any decaying wood, or putrifying animal we see. In fact, bacteria are very important in helping to keep the world from becoming cluttered with dead plants and animals. Molds and many fungi help in this work. This decomposition of dead organisms goes on at a particularly high rate during warm weather. One of the products of the decomposition is carbon dioxide, which escapes into the air and can be used by green plants for the manufacture of simple food stuffs (such as sugars) which the human body and most other animals are unable to make, but which they must have in their food.

We are likely to find on any of the trails a quartz stone (preferably white) with a visible growth of millions of one-celled, microscopic green algae on its under side. Such stones are usually of medium size, and have been partly embedded in the soil for some time. White quartz transmits the sun's rays which enable the algae to carry on photosynthesis, and there is commonly some moisture in the soil beneath the stone. Here the algae may be protected from lack of water and from extremes of temperature, in a place where there is little competition for the necessities of plant life.

There are plenty of other green algae out of sight in the many lichens to be seen on rocks and tree trunks about the school. The fungus part of a lichen serves as a protection for the enclosed algae, while the algae, by means of carbon dioxide, water, and the energy of sunlight, furnish the food which the fungus is unable to manufacture.

b) Our second group of plants consist of the mosses. These are many-celled plants, and not difficult to find, although they are never very tall. Because they are without a well-developed fluid-conducting system and without very effective supporting tissue (that is, tough fibrous tissue), individual plants are unable to attain much size or grow very tall. Ancestors of mosses first appeared on the earth about 250 million years ago, and some of the kinds have changed but little since early times.

c) The third group of plants in our rough-and-ready classification today, includes the Conifers, that is, the pines, firs, spruces and junipers. Paleontologists tell us that the earliest members of the group appeared about 225 million years ago. There has been a decline in the conifer population of the world, so that they are no longer dominant among the trees of the earth.

d) The fourth and most numerous group of plants in the school area are what we call the "flowering plants", although actually the conifers have flowers, too. Most of such plants are non-woody, and are called herbs; a few are trees (aspen, for example); and some are shrubs. According to the fossil record, the plants in this group first developed about 140 million years ago.

Man, by the way, has been around for about one million years, they say.

Plants of this fourth group are called Angiosperms and have been especially successful in competing with other plants for food and living space. Most of our cultivated plants - food and ornamental - belong to the group also.

PLANTS AS MAKERS OF SOIL

Rock materials of the earth's surface must be broken into fragments before soil can be formed. When a stream changes its course, leaving a dry river bed, the first invaders are usually annual plants whose seeds are blown or washed over the surface. These are the kinds of plants we call weeds. Since they are seldom usable by man directly, we often overlook the immense good they do in healing over the bare surfaces on which they can live. Weeds are nature's scar tissue. They hold the raw mineral stuff in place and encourage the invasion of animals whose droppings and remains add organic matter and start the building of what we know as soil. These weeds afford shade and protection for the more permanent kinds of plants.

There are simple forms of plant life which help in the task of breaking up hard rock. Such plants are the lichens which can be seen on rocks and boulders. Clinging tightly to the rock face, these lichens work upon it by secreting acids which dissolve the cementing substance of the rock, loosening particles from its surface. Or they may, with alternate swelling and shrinking of wet and dry weather, pull upon the rock, loosening grains of rocks. This action is best illustrated by comparing it with the tension of drying glue upon the skin. When hot, the glue spreads out and clings; when cool and dry, it shrinks and pulls. It is possible to scrape off a bit of lichen with a knife and see or feel the gritty rock particles on its underside. One can generally note that the surface from which the lichen has been taken is pitted.

The loosened rock particles are washed or blown into crevices. Woody plants begin to grow and their roots loosen the rock fragments through which they must make their way. After hundreds and hundreds of years, what has been rock becomes covered with a mantle of weathered material in which vegetation is at home. Soil has been formed.

Fungi and bacteria are also important in soil formation. These bring about the decay of plant and animal remains. Such decay returns minerals to the soil. It also produces spongy dark humus, which will hold three times its own weight in water, permitting it to soak slowly into the ground. Bacteria also enrich the soil by bringing nitrogen from the air into the soil and transforming it into minerals which plants can use in making protein foods which are necessary for all life.

COMMON FUNGI

Fungi are, usually, minute plants without root, stem, or leaf and are represented by such forms as mushrooms, toadstools, mildews, rusts, and molds. They are classed as plants because of their structure and reproduction. However their ways of securing food are different from the process of photosynthesis used by ordinary green plants. The fungi secure their food for growth by one of two ways: they use dead plants or animals: or they use living plants or animals. Those that secure their food from dead plants or animals are saprophytes. Those that secure their food from living plants or animals are parasites.

In some cases fungi secure their foods by absorbing the sugars and mineral from the material upon which they grow. For example, the molds found on jelly and jam secure some food this way. Other fungi has to break the food material down by the action of enzymes secreted by the fungus. This action will change the material to a simple food on which it can feed. Dark spots on damp cloth, molds on leather or bread are examples of this action.

The destruction of organic matter is not brought about by one kind of fungus but by a number of different kinds that operate at the same time or that succeed one another. The decay of a log, tree, or stump of a particular species may be started by one of a number of fungi brought to the wood by air currents carrying the spores. Destruction may already be in progress due to some wood-rotting fungus that has attached itself to the living tree. This disintegration occurs slowly, but not so slowly that changes can't be seen in only a few months or years.

Most plant diseases are caused by different species of fungi that grow into or through the tissue of the plant. Absorbtion of foods from the plant will allow the fungus to continue to grow but will also weaken the plant so that it cannot make sufficient food to keep alive. Some feel that the fungus secretes a toxin that kills the plant. Trees infected by wood rotting fungi blow over easily, and also lose their value as timber because the heartwood may be almost completely destroyed.

Fungi reproduce by microscopic bodies called spores. Most fungi produce many spores. It is estimated that the bracket or shelf fungi produces 30,000,000 spores each day. However, only a few of these spores manage to survive. The spore is carried by some means, most often wind, away from the parent. If there are proper conditions (moisture, temperature, and food material) it will grow.

That spores of different fungi are in the air can be demonstrated by this experiment. Use a very lightly moistened slice of bread and expose it to the open air for ten or fifteen minutes. Then, store it in a warm place under some cover so it will not dry out. Different kinds of mold will develop.

HOW TREES LIVE

You will find that your enjoyment of the forest will be immesurably increased if you have an understanding of just how a tree lives and grows, and what its relationships to the other trees and animals that make up the forest community may be.

How a Tree Grows

We may think of a tree as having three main parts. These are its roots, trunk, and leaves. The roots are mainly for anchoring the tree firmly in the ground, and for taking up moisture from the soil. The trunk acts as a prop for supporting the branches with their leaves toward the sunlight, and for carrying sap to and from the leaves. The leaves are good factories where the food for the tree is manufactured. A tree grows outward and terminally upward. Trees are the oldest and the largest living things on the face of the earth.

What's Under the Bark?

If we make a cross section through the trunk or any of its branches, we will note three main parts: the hard center, or heartwood; the outer ring, or sapwood; and the bark. If we look closely at our cross section, we will see lines in the form of circles or rings. These are called annual rings. Usually one of these rings is laid down every year, representing the new growth for that year.

In the living tree, the heartwood is actually dead wood. Its only purpose is to provide strength for the trunk. That is why a tree may go on growing, although the heartwood may be completely gone and the trunk be hollow. The sapwood is the vital part of the tree. It is through the sapwood that water with various substances dissolved in it, is carried upward from the roots to the leaves. This takes place through tiny pipes or vessels, the sap passing from one cell to another through the very thin cell walls.

Between the sapwood and the bark is a very thin layer of cells which can be seen only with the aid of a microscope. However, this is one of the most important parts of the tree. This is the CAMBIUM layer. It is here that the growth in circumference of the trunk, branch, and twig takes place. The cambium layer grows new wood and bark.

On the inner side of the cambium cells, new sapwood is being made and added to the sapwood already there. On the other side, new inner bark is being made and added to the underside of the bark already there. Thus the annual rings of growth in the wood are produced. As this process goes on, the sapwood toward the center of the tree gradually turns to heartwood. The inner bark, or portion just outside the cambium layer, contains a system of conducting vessels or pipes of microscopic size, through which foods, manufactured in the leaves, are transferred downwards in solution from the leaves to other parts of the tree, including its roots.

Various species of trees can be recognized by the outer bark alone. The outer bark serves as the tree's armor and helps protect it from injury, from insects and fungi, and from loss of water evaporation.

How Trees Get Food

Trees make their own food and it is mainly in the leaves that the manufacturing process goes forward. We may well think of the leaves of plants as chemical laboratories wherein complex processes manufacture plant food. The most important factor in this chemical process is a green substance called "chlorophyll". Chlorophyll gives the leaf its green color. It is contained in certain structures within the cells of the leaf. These structures are called chloroplasts. Air enters the leaf through tiny openings, usually on its underside, called stomata. The air comes in contact with the leaf cells and the cells take, from the air, carbon, which is present in the form of carbon dioxide (CO_2). From the soil about the roots, water is transported from cell to cell in the sapwood until it finally reaches the leaves and the structures known as chloroplasts in the leaves. From this water (H_2O) both hydrogen and oxygen are taken. When sunlight falls upon the leaf surface, it is absorbed by the chlorophyll, and chemical action takes place. Although we do not understand how, under the influence of sunlight, carbon, hydrogen, and oxygen are combined and sugar is formed. This whole process is called photosynthesis. Since all plant life has to depend upon the sun and man and all other animals are dependent upon plants for food, photosynthesis becomes the most important chemical process in the universe.

In most plants the sugar is changed into starch and deposited in the leaf cells. Later and particularly at night when the process of photosynthesis is not going on, the starch is changed back into sugar and carried in solution in the sap to other parts of the tree through the vessels or pipe lines in the inner bark of the tree just outside the cambium layer. The distribution of food inward and outward is accomplished through the medullary rays which can be seen in a cross section of wood as small lines radiating from the center of the tree like spokes of a wheel.

Trees are very important to the American People. We may think of the forest as a great food factory, producing the food that is the basis upon which all of the animal life within the forest is built up.

EVERGREEN TREES

The Evergreen Trees, or Conifers, are knows to many people as "Pines". However, they are really composed of pines, spruces, firs, Douglas-fir, and Junipers. There are several kinds of each of these. They are not hard to tell apart as the leaves (or needles) and cones are usually quite different. The following key will help with identification.

Key to the Conifers

I. PINES

Needles are gathered together at the base in clusters of 2-5 in a little sheath that usually wears off after the first year. Cones have thick woody scales. Seeds mature in two seasons. The pines of this region are Bristlecone, Limber, Lodgepole, and Ponderosa.

A. Needles in cluster of fine
  1. Bristlecone Pine (Pinus aristata)
    a. Needles
      (1) 1-1½ inches long
      (2) Almost always covered with tiny specks of pitch
    b. Cones
      (1) Long and slender
      (2) Sharp bristles on tips of the scales
    c. Wood mainly used for cordwood
    d. Sometimes called "Foxtail Pine"
  2. Limber Pine (Pinus Flexilis)
    a. Needles
      (1) 1½-3 inches long
      (2) More flexible than those of Bristlecone Pine
      (3) Fine almost silky needles
    b. Cones
      (1) 3-10 inches long
      (2) large-sized seed
    c. Wood used mainly for cordwood and ties

B. Needles in clusters of two or three
  1. Ponderosa Pine (Pinus ponderosa)
    a. Needles
      (1) 3-7 inches long
    b. Cones
      (1) 3-5 inches long
      (2) Cone scales armed with spines
    c. Bark
      (1) When young, dark (sometimes called "Black Jack" Pine
      (2) When older, yellowish and in thick plates (often called "Yellow" Pine)
    d. Wood valuable for lumber of almost any description

C. Needles usually in clusters of two
  1. Lodgepole Pine (Pinus contorta var. latifolia)
    a. Needles
      (1) 1½-2 inches long
      (2) Yellow-green in color
    b. Cones
      (1) Small, hard, and one-sided
      (2) 1½-2 inches long
      (3) Cling to branches for years with oprning or dropping their seeds
    c. Bark - thin, usually not more than ¼ inch thick
    d. Wood
      (1) When young used by Indians for lodgepoles
      (2) Used for lumber - especially valuable for mine props and railroad ties

II. SPRUCES

Needles are sharp-pointed and four-sided and are attached singly on all sides of the twigs. When they break off, the twigs are rough like a grater. Cones hang down (pendent) and have parchment-like scales.

A. Blue Spruce (Picea pungens)
  1. Needles
    a. Less than an inch in length
    b. Color varies from silver (blue) to green
  2. Cones
    a. Over 3 inches long
  3. New growth tips are smooth
  4. Main trunk
    a. Has a number of tiny twigs only a few inches long in addition to and usually between main whorls of branches
    b. Twigs usually keep pushing out on trunk for many years
    c. After stem becomes large and the twigs die, they give the trunk an unkept, unbrushed appearance
  5. Bark - on mature trees is furrowed
  6. Used widely for ornamental planting
  7. Wood
    a. Sometimes used for lumber
    b. Suitable for paper pulp

B. Engelmann Spruce (Picea Engelmanni)
  1. Needles
    a. 1 inch long
    b. Disagreeable odor when crushed
  2. Cones
    a. 2 inches long with thin scales
    b. Light brown
  3. New growth tips are finely hairy
  4. Main trunk is smooth and clean
  5. Bark
    a. Begins to peel off at an early age in thin flakes
    b. When older, bark becomes red-brown and scaly

    - e. Wood valuable for paper pulp manufacture

III. FIRS

Needles blunt, flat, and faily soft to the touch, leaving smooth round scars when they fall off. Buds blunt and pitchy, cones are erect on upper branches of the tree, falling to pieces at the first frost instead of dropping off the tree whole.

A. Alpine Fir
- 1. Needles
  - a. 1 inch long
  - b. turn upward so that foliage of a particular branch appears flattened and as though no leaves were attached to lower sides of twigs
- 2. Cones
  - a. Purple
  - b. Scales of cone fall off
- 3. Crown
  - a. Sharp and spire-like
- 4. Bark - smooth, grayish white
- 5. Wood
  - a. White, soft and brittle
  - b. used for rough construction and boxes

B. White Fir
- 1. Needles
  - a. 2 inches or more inches in length
  - b. Pale-green in color
- 2. Cones -
  - a. 4 to 8 inches
  - b. Upright
- 3. Bark Gray to Red Brown
- 4. Wood
  - a. White, soft and brittle

IV. DOUGLAS-FIR

Neither a true fir nor a spruce, but somewhat similar to the hemlock

- A. Needles
  - 1. 3/4 inches long
  - 2. Soft to touch
  - 3. Needles narrow before joining twig
- B. Cones
  - 1. Pendant
  - 2. 3 inches long
  - 3. three pointed bract protruding from scales
- C. Bark is Dark Gray-brown and deeply furrowed
- D. Wood
  - 1. Is of high value
  - 2. Especially good for bridge timber, railroad ties and construction wood

V. JUNIPERS

Cones reduced to small bluish berries. Needles reduced to little green scales on the twigs, though sometimes spreading and about ½ inch long, making twigs very prickly to the touch

A. Rocky Mountain Juniper

1. Berries about the size of peas and bluish-black
2. Bark scaly
3. Twigs slender and graceful
4. Wood
    a. Not straight or tall enough for lumber
    b. Valuable for fence posts as it is slow to decay

METHOD USED BY U.S. FOREST SERVICE

FOR SELECTION OF TREES TO BE CUT FOR COMMERCIAL USE

The group of Ponderosa Pine trees from which the selection for cutting is made is known as a "tree stand". One such tree stand is located a couple of blocks down the main road beyond the barn.

All trees in the stand are numbered in sequence with yellow paint. The letter "C" signifies that the tree would be cut if this was a commercial stand of trees which was being selected for a future cutting. The letter "L" is used to indicate the trees that are to be left.

It should be made clear to the children that this tree stand was marked so that all pupils who attend the Outdoor Education School may understand how and why some trees are cut and others not. None of the trees included in this stand will be cut.

The following information has been supplied by the timber management staff of the Arapahoe National Forest, U.S. Forest Service.

This method of harvesting is used by the Forest Service for selection of trees in all National Forests.

1 C: Cut this Ponderosa pine because it is a "wolf tree". That means it has large spreading branches so that the tree dominates a disproportionately large area of ground. The tree was able to develop such large branches because there were no trees close enough to suppress the growth of its branches by shutting out the light. The large branches produce very large knots on the main stem of the tree so that the lumber obtained from the logs will be so knotty the lumber will have no commercial value. New trees for subsequent harvest will not grow and develop under such a tree. Also, this tree has a multiple crown indicating that it will not make any more appreciable growth in height.

2 C: Cut this pine tree because it is leaning, and the branches are so large that the main stem will not make good lumber. A leaning tree usually develops differential stresses in the wood in order to support itself. Therefore, the leaning will negatively effect the quality of the lumber. The lumber will have a greater tendency to warp. Because the tree is growing in an exposed site, the branchiness will increase and possibly the the degree of leaning.

The two trees to the right of the 2 C are not marked because their basic fault - being exposed on the edge of the stand of trees - is the same as that of 2 C, so they should also be harvested now. Their defects will increase because they cannot be managed on the edge of the stand.

3 L: Leave this tree standing because it has good form. It is straight and tall in relation to its diameter. The terminal leader in the crown is pointed. This leader indicates that the tree will continue to grow in height appreciably. The dark-colored bark is indicative of the tree's youth. (The bark is redder on older trees.) These young Ponderosa pine are often called "Jack pine".

4 L: Leave the tree because it has good form and is growing well. The small dead branches on the lower part of the tree tell us that the knots will be small and, therefore, the lumber will be of good quality. This tree is "growing lumber - not branches".

5 C: This tree is ready to harvest. It is large and mature. Such a mature tree is more susceptible than younger pines to Ponderosa pine bettle infestation, so it should be harvested while it has good quality lumber in it. The surrounding trees will be further protected against a beetle attack if the mature tree is harvested now.

6 C: Cut this tree because it is crooked (few boards can be cut out of it). It's leaning, "limby" and has a spiked top (indicating little potential for additional height growth). It is a poor prospect for producing good lumber.

7 L: Leave this tree because it is making lumber rather than branches. It has a good top and appears to be a vigorous tree.

8 C: This is another wolf tree like 1 C. It has large branches and two leaders in the crown instead of one as is desirable. Notice how the greater exposure to the south and west, where it has not had to compete for light with other trees, has resulted in greater branching in these directions.

9 L: Let it continue to grow. The lower limbs are small. The higher branches are vigorous and the terminal leader has good form. It's still young. It will produce additional lumber of good quality.

10 C: This tree will never produce lumber. It is leaning, crooked, and suppressed by other trees which over-top it to keep out much light which is needed for growth.

11 C: Cut because it has big limbs and the terminal leader is poorly developed. Its prospects for producing good lumber are poor. The space should be made available for new trees that might have better form.

12 L: It has good height in relation to its diameter. It is still young. By cutting 11 C, this tree will be given some release from competition to encourage greater diameter and height growth.

13 L: Leave this tree to grow lumber. Basically it has good form. The lower limbs are not growing much. This is a good example to illustrate that trees cannot be grown alone if the objective is to produce lumber. They must be grown together so they influence each other's growth. Yet, they must be spaced sufficiently far apart to have room in which to grow. If they all have to "reach for the sky" to get enough light to live and prosper, and if they have a fair chance of doing so without being over-topped and suppressed by surrounding older trees, they will grow straight. Their lower limbs will be small (for want of light) so the lumber will have small knots.

14 L: Leave this tree to grow lumber as it is growing well.

15 C: This tree is infected with the fungus disease called "dwarf mistletoe". (It has no relation to the Christmas holiday's form of mistletoe.) This disease can kill the tree, or at least so deform it and stunt its growth that the tree will not produce commercial lumber. The tree should be harvested to prevent further spreading of the disease to neighboring pines.

BIRD MIGRATIONS

The trips that birds made at regular times between two definite places are called migrations. The world's great waves of migration, by hundreds of different species, take their direction only toward the north for the nesting season, whether in the western hemisphere or the eastern hemisphere or the eastern hemisphere.

Most birds have lower flying speed than might be imagined and their travels between their summer and winter homes may require weeks or months of time. The robin, crow, and most sparrows can only cruise at 20 to 25 miles an hour. Even the barn swallow can travel only about 30 miles an hour.

The main impulse behind the great waves of migration appears to be the fact that the species as a whole must find enough food in the nesting season to supply themselves and their broods with the span of daylight at a given latitude. No single theory of bird migration meets all the tests that can be applied because habits and ranges vary so widely that it is difficult to apply a general rule.

Many people have felt that migrations were entirely explained by temperature, but this is not true. There are many birds that do not encounter severe winter temperatures, but they do not fly south merely to avoid it. Temperature is not the answer, for regardless of temperature, you can safely count upon the spring arrival of many of the birds in March and April even if snow is still on the ground and the temperatures are low.

One factor that probably has an effect on migration is the number of daylight hours. The number of hours per day required by certain birds to catch sufficient food for their abnormally high needs in the nesting season is very important. In the nesting season, the vital problem of the daily food supply must assume formidable proportions for mated birds with young. A nest of four to eight birds means that each parent must catch from three to five times its own quota of insects. Not only do fledglings eat even more food than a grown bird, but the adult's own need is greater in the breeding season because of its intense activity in feeding and protecting its young.

Scientific research has thrown additional light upon the movements of birds before and after the nesting season. The influence of light transmitted through the eyes of birds upon the pituitary, thyroid and hypolthalamus glands accelerates the reproductive mechanism. Recent investagations demonstrate the influence of ultra-violet light in mobilizing lime for eggshells, thus permitting larger broods. Current research into the reaction of the glands to such stimuli as increased or decreased duration and intensity of light, changes of good, greater amount of exercise, and other factors may explain why birds have larger broods in the higher latitudes. The first is the longer span of daylight assures parents greater ability to feed and raise a large number of young. The second is the stimulus of an increasing length of daylight upon the reproductive mechanism itself. The third is the effect of the ultra-violet light of northern ranges in providing a relatively large brood.

The three most striking features of the drama of bird migration, are closely linked to a number of powerful geographical, astronomical, and physiological influences. Even for a single kind of bird, the instinct probably stems from many different causes. The long northward flights just before the nesting season, the tendency of the most individual migrant birds to nest at the northern limit of their flight, and return to a more temperate area of shorter daylight promptly at the close of the breeding period.

BIRDS AT THE OUTDOOR EDUCATION LABORATORY SCHOOL

The following is a partial list of birds identified at the laboratory school.

Bluebird, Mountain
Chickadee, Blackcapped
    " , Mountain
Goldfinch, American
    (often called a Wild Canary)
Hawk, Red-tailed
Hummingbird, Broad-tailed
Jay, Rocky Mountain
    (often called Camp Robber)
Jay, Steller's
Junco, Gray-headed (rust wing)
Magpie
Nutcracker, Clark's
Nuthatch, Rocky Mountain
Raven
Robin
Sapsucker, Williamson's
    " , Yellow-bellied
Swallow, Violet-green
Tanager, Western
Turkey, Wild
Woodpecker, Downy
    " , Hairy
    " , Red-headed
Wren, Winter

WILDFLOWERS

The following is a partial list of plants likely to be found in the region of the Outdoor Education Laboratory School.

- Bellflower Family
    - Harebell
    - Parry Bellflower
- Borage Family
    - Chiming Bells
    - False Forget-me-not
    - Miner's Candle
    - Puccoon
    - Stickseed
- Buckwheat Family
    - Dock
    - Knotweed
    - Sulphur Flower
    - Winged Eriogonum
- Buttercup Family
    - Bush Clematis
    - Buttercup
    - Columbine
    - Larkspur
    - Meadow Anemone
    - Meadow-Rue
    - Monkshood
    - Pasque Flower
- Caper Family
    - Rocky-Mountain Bee Plant
- Composite Family
    - Black-eyed Susan
    - Canada Thistle
    - Chicory Lettece
    - Curlycup Gumweed
    - Dandelion
    - Daisy Fleabane
    - False Dandelion
    - Gaillardia
    - Golden Ragwort
    - Goldenrod
    - Pearly Everlasting
    - Pussytoes
- Composite Family (continued)
    - Salsify
    - Showy Fleabane
    - Sunflower
    - Tall Coneflower
    - Tall Tansy Aster
    - Wavyleaf Thistle
    - Yarrow
- Dogbane Family
    - Spreading Dogbane
- Evening Primrose Family
    - Cut-leaf Evening Primrose
    - Fireweed
    - Yellow Evening Primrose
    - Stemless Evening Primrose
- Figwort Family
    - Bunny-in-the-grass
    - Butter and Eggs
    - Indian Paint Brush
    - Little Red Elephant
    - Mullein
    - Owl-Clover
    - Penstemon
    - Veronica or Speedwell
- Flax Family
    - Blue Flax
- Geranium Family
    - Fremont's Geranium
    - Richardson's Geranium
- Goosefoot Family
    - Strawberry Blite
- Heath Family
    - Billberry
    - Kinnikinnick or Bearberry

- Heath Family (continued)
  - Pipsissewa
  - Pyrola
  - Woodnymph

- Iris Family
  - Blue-eyed Grass
  - Wild Iris

- Lily Family
  - False Solomon's Seal
  - Mariposa Lily
  - Wandlily
    - or Death Camus
  - Wild Onion
  - Wood Lily

- Loasa Family
  - Evening Star

- Madder Family
  - Bedstraw

- Milkweed Family
  - Showy Milkweed
  - Butterfly-weed

- Mint Family
  - Brook Mint
  - Horsemint
  - Marsh Mint
  - Skullcap

- Morning Glory Family
  - Creeping-Jenny
    - or Bindweed

- Mustard Family
  - Jim Hill Mustard
  - Penny-Cress
  - Rock Cress (Arabis)
  - Shepherd's Purse
  - Tansy Mustard
  - Wallflower
  - Wild Candytuft

- Parsnip Family
  - Angelica
    - or Hercules Club
  - Cow Parsnip
  - Mountain Parsley

- Pea Family
  - Golden Banner
  - Lambert's Loco
  - Milk Vetch
  - Mountain Lupine
  - Red Clover
  - Scurfpea
  - Sweet-Clover
  - White Clover

- Phlox Family
  - Collomia
  - Fairy Trumpet
    - or Scarlet Gilia
  - Jacob's Ladder
    - or Skunkleaf
  - Leafy Jacob's Ladder

- Pink Family
  - Chickweed
  - Evening Campion
    - or White Cockle
  - Grass-leaf Sandwort
  - Starwort

- Poppy Family
  - Pricklepoppy

- Primrose Family
  - Rock Primrose
  - Shooting Star

- Purslane Family
  - Common Turslane
  - Spring Beauty

- Rose Family
  - Chokecherry (Shrub)
  - Bushy Cinquefoil
  - Leafy Cinquefoil
  - Mountain Mahogany (Shrub)
  - Raspberry (Shrub)
  - Wild Rose
  - Wild Strawberry

- Saxifrage Family
  - Alumroot
  - Gooseberry (Shrub)
  - Rock Spirea (Shrub)
  - Squaw Currant
    - or Wax Currant (Shrub)

- Waxflower
    - or Mountain Mock Orange (Shrub)
- Snowball Saxifrage

Spiderwort Family
- Spiderwort

St. Johnswort Family
- Southwestern St. Johnswort

Stonecrop or Orpine Family
- Stonecrop

Waterleaf Family
- Waterleaf
- Scorpion-weed

PART VI

Appendix

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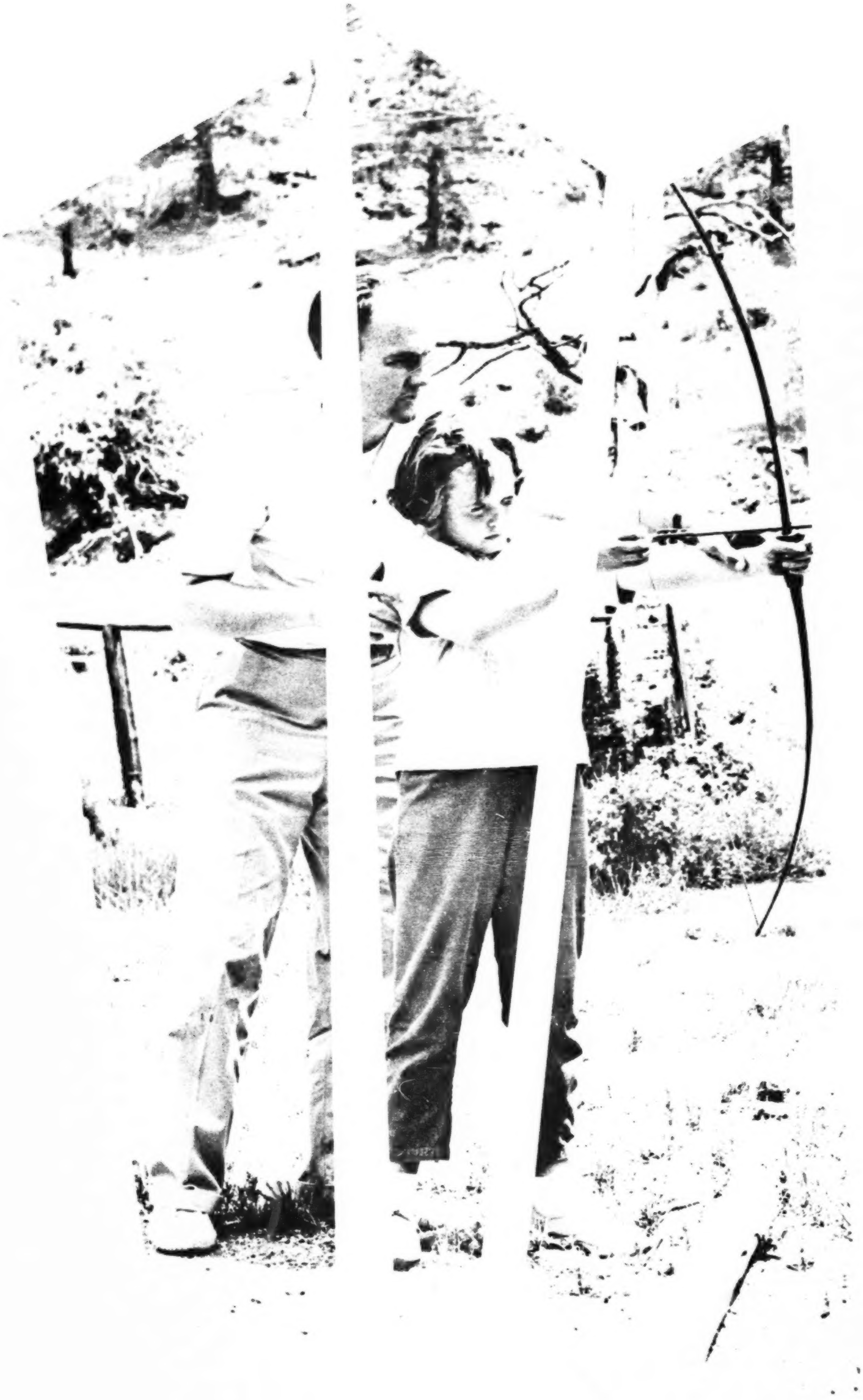


RULES AND TIPS FOR STUDENTS

The Outdoor Education Laboratory School is a child's community, inherent with all the usual problems of health, sanitation, safety, and care of public property. Learning to live democratically is one of the essential outcomes of the program. Standards of behavior should be discussed with the children in order to ensure that the best advantage is made of the learning opportunities of the laboratory school.

Riding the Bus

1. Fill the seats in orderly fashion, from back of bus to front.
2. Students should remain in their seats when the bus is moving.
3. Students may talk quietly to their seat partners.
4. Students should not change the position of the windows without permission of the bus driver or teacher.
5. All talking should cease when the bus makes observation stops on the way to the laboratory school or when the teachers are pointing out items of interest along the route.

Dining Hall

1. Student hosts and hostesses, one a day for each ten students, will be selected by the teachers during preplanning. Post a list by table number on the bulletin board in the dining hall.
2. The Program coordinator supervises the work of these students. Some of their duties are:
   a) Reporting to dining hall 15 minutes before meals
   b) Setting of their assigned table
   c) Serving as a waiter for their table
   d) Clearing and cleaning their table
3. Before entering the dining hall, students form two lines on the porch, one for boys and one for girls. During inclement weather students enter and wait quietly in line inside the dining hall.
4. The Program Coordinator will notify the students when they may take their places at the table to stand quietly until Grace is offered.

5. Planning for Grace is the responsibility of the teacher-chairman and teachers.

6. The seating arrangement of the dining hall is the responsibility of the teachers and should be planned during "preplanning". A diagram of the dining hall is included in the Appendix.

7. The laboratory school principal is in charge of the dining hall. In absence of the principal, the program coordinator is in charge.

8. Students will remain seated after each meal to wait for announcements.

9. Students should be reminded to practice courtesy and remember their table manners in the dining hall.

10. Adults should set a good example by keeping table conversation low since this is what is expected of the children.

" HELPERS READY FOR HUNGRY HORDE "

Dormitory

1. Teachers will make bunk and housekeeping assignments during preplanning meetings. These schedules are posted in the dormitory immediately upon arrival at the laboratory school.

2. The dormitory counselors will review dorm routines and rules with the students after arrival.

3. Students should be in bed and quiet by 9:00 p.m. Except to go to the bathroom, the students should remain in bed until the dormitory counselor gives them permission to get up.

4. Students are to make their own beds and clean their bunk area each morning. Suitcases, boxes, and clothing should be placed on the bed so the floors may be swept.

5. Students are not to leave the dormitory area in the morning until dormitory inspection has been completed. A "Daily Dorm Inspection Check off" is included in the Appendix.

6. Students are to remain in their dorm area during rest periods.

7. Students are not to visit other dormitories without the permission of their dorm counselor.

8. Students should take at least one shower during the week.

9. Towels and washclothes should be placed on the bed railing to dry

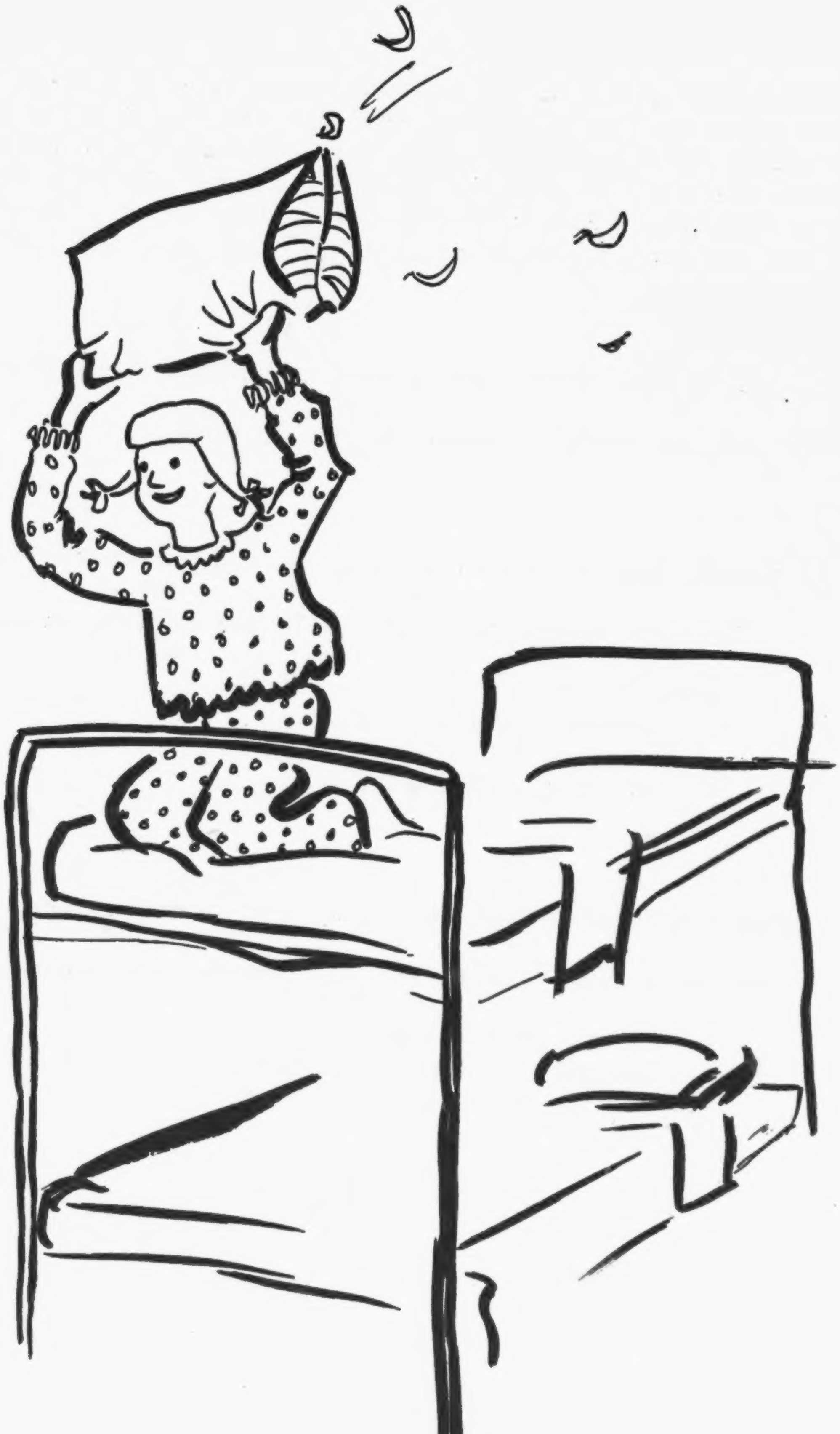
10. Students should go directly to their dormitory after the evening program.

11. The dormitory counselor is encouraged to read or tell the students one or two stories when all are in bed. Refrain from choosing ghost or exciting stories.

12. The classroom teacher and dormitory counselor should discuss with the students the importance of dormitory safety rules in order to avoid injuries resulting from "horseplay" and running.

13. Students should be given information as to the proper procedure to follow during a fire drill. The signal for a fire drill is a steady blowing of the horn.

14. Requests for dormitory maintenance or supplies should be directed to the laboratory school principal.



COMMUNICATIONS

Interpreting of the Outdoor Education Program to the parents is an important part of the planning. The children have probably already reported to their parents. However, the parents need to have the details in order to do their own planning for the fee and supplies. The following shows what is considered the best time for sending of communications home with the students.

20 SCHOOL DAYS before attendance at the laboratory school:

Dr. Bottomly's letter to the parents

15 SCHOOL DAYS before attendance at the laboratory school:

The home school principal's letter to the parents

with
- Parent Permission slip
- Emergency Information Card
- Student's Check List

1 SCHOOL DAY before attendance at the laboratory school:

By this time parents should have sent to the home school:

- Parent Permission slip
- Emergency Information Card
- Fee for attendance - $15.00

JEFFERSON COUNTY PUBLIC SCHOOLS
ADMINISTRATION BUILDING
1580 YARROW STREET
LAKEWOOD, COLORADO

Dear Parents:

For several years the Jefferson County Public Schools have included outdoor education as part of their regular instructional program. They have always regretted that the number of children participating had to be limited due to lack of facilities. Last year the Board of Education, through the purchase of the Dodge Ranch above Evergreen, made it possible for approximately one-hundred-twenty children at one time to be included in the program.

An instructional program was developed, making maximum use of the beautiful natural resources at the school site, that seemed best suited to the age and interests of children in the sixth grade. This year it will be possible for all sixth graders in the school system to have an opportunity to spend one week at the Outdoor Education Laboratory School.

The outdoor program provides our boys and girls with a first hand study of their natural resources. They will follow planned mountain trails studying plants and animals. They will learn about nature's web of life and its relationship to our health, economy and well-being. They will study geology and with the aid of a telescope the stars and planets. They will have many learning experiences including citizenship not possible in their classrooms.

The children will be well cared for, as the school maintains a well-qualified, permanent staff. Excellent food and housing accommodations are provided. A registered nurse is employed to take care of the health needs. Two Evergreen doctors are on call. The teachers of your children will also be at the school during the entire week.

We believe this program may well be one of the high spots of your child's educational experience. Few states offer its children the natural environment Colorado does to walk the mountain trails, see the beautiful doe with her young fawn, be fascinated by the limber pine trees and discover and explore many of nature's secrets.

You will be receiving a letter from your child's principal within a few days giving more detailed information. Please feel free to call him if you have any questions regarding this matter.

Sincerely,

Forbes Bottomly

Forbes Bottomly, Superintendent
Jefferson County Public Schools

~~Eiber School, Nov. 2, 1965~~

Dear Parents,

In a few weeks the sixth grade classes of EIBER School will have the opportunity to attend our Outdoor Education Laboratory School for a period of five days. The activities in this program will include experiences in conservation, nature lore, and exploration.

The week spent at the Outdoor Education Laboratory School can be one of the high spots of your child's education experience. It is a carefully planned learning project that cannot be duplicated in the classroom. Conservation, the value of our water-sheds and forest resources may be learned in their natural setting. Democratic group living in the laboratory school environment affords opportunities for healthful living, character development, and social adjustment which can rarely be found elsewhere.

The following are items of general information.

DATE: School bus leaves EIBER School at (time) on (day and month) and returns to school at about (time) on (day and month) .

COST: $15.00. This is the total fee and covers transportation, all meals, and insurance. The fee may be sent with the permission slip or anytime prior to the scheduled time of departure for the laboratory school.

SUPERVISION: Students will be under the supervision of their classroom teacher, the Coordinator of Program, and the Principal of the Outdoor Education Laboratory School. The cooking is done by school cooks. A nurse will inspect the students prior to their departure from the home school. A nurse is on duty at the laboratory school for two hours each morning. Two doctors in Evergreen are available on call.

FACILITIES: A lodge, four dormitories with showers and lavatories, and a dining hall with adjoining kitchen are provided for all children participating.

ADDRESS: Jefferson County Outdoor Education Laboratory School
Evergreen, Colorado

WHAT TO BRING: Attached herewith you will find a list which will serve as a reminder of articles the student should bring with him to the laboratory school.
Any equipment the student brings should be clearly marked with his name for easy identification.

WHAT NOT TO BRING: The following items are not needed or allowed on the trip. In order to keep lost articles at the minimum, we request that these items be left at home:

- Watches
- Rings
- Money
- Radios or transistors
- Candy, gum, or food stuffs of any kind
- Flashlights
- Hunting knives
- Back packs
- Magnifying glasses
- Compasses
- Whistles
- Canteens

Any of these materials that are needed are already available at the laboratory school.

ITEMS NECESSARY FOR THE SCHOOL: If for any reason it is necessary that your child be given medicine, please inform this office in writing as to the amount and frequency. The school staff will not administer medicine without your specific directions in writing.

Attached to this letter is a form that must accompany each child. Please check every item and be sure the form is complete.

If your child rides the bus or lives any distance from the home school, parents are requested to pick them up after their arrival back on Friday. They should arrive back between the hours of 2 and 3 p.m.

Thank you for your cooperation and support. Please feel free to call the school office if you have any further questions.

Sincerely yours,

[illegible] D. Amstutz

Principal

PERMISSION SLIP:

This is to certify that I give my permission for

____
Child's full name

to go and take part in the Jefferson County Outdoor Education program. I understand that transportation will be furnished by school bus to and from the Outdoor Education Laboratory School.

_____Fee accompanies this permission slip.

_____Fee will be sent later.

Date:________________ Signed:______________________________
Parent or Guardian

EMERGENCY INFORMATION CARD

Child's Name____Age_____ Date__________

Parent's Name____

Parent's Address____

Home Phone_________________________Emergency Phone______________________

Family Doctor________________________Doctor's Phone______________________

Date of last Tetanus Shot_____________________

Can Aspirin be given? _____Yes _____No

Can Merthiolate be used? _____Yes _____No

Insurance Coverage - Name of Personal Family Plan____________________________

Miscellaneous information such as medication required and dosage to be given, sleep walker, allergies, and any other medical history that might be pertinent, is to be put on the other side of this card.

____

Parent's Signature

INSTRUCTIONAL AIDS

The following are available through our Instructional Aids Center. These are not the only instructional aids that are available but are considered to be the ones that most closely follow the curriculum for the Outdoor Education Laboratory School.

Films - 16mm

Number	Name
816	Bear Grass Creek (shows water pollution)
257	Common Animals of the Woods
665	Earth's Changing Surface
823	Eyes in Outer Space
486	How Many Stars
445	Mammals of the Rocky Mountains
14	Minerals and Rocks
499	Plant Life at Work
388	Plants Make Food
446	River of Ice
818	Secrets of the Ant and Insect World
819	Secrets of the Bee World
820	Secrets of the Plant World
258	Treasures of the Earth

Filmstrips

Number	Name
U-3	The Face of the Land
Y-22	Forest Fires - kinds, causes, cost, and control
KK-17	The Miracle of Water
DD-27	The Problems of Soil
GG-39	Soil (formation of soil and its relation to plant growth)
N-25	Story of Ice and Glaciers
M-22	Story of Underground Water
Z-42	Telescope and Science

Slides

Geological Slide set showing some of the rock formations between Denver and the Outdoor Education Laboratory School

Kits

Rock Kit - contains samples of rocks and minerals found in Jefferson County

SLIDES, FILMSTRIPS, AND TAPES AT OUTDOOR EDUCATION SCHOOL

Tape and Slides

Geology of the Front Range
"On the Way" Trail

Tape and Filmstrips

Birds and Their Songs (4)

Filmstrips

- Conserving our Natural Resources:
  - What is Conservation
  - Enough Water for Everyone
  - Improving our Grasslands
  - Saving our Soil
  - Using our Forests Wisely
  - Giving our Wildlife a Chance
  - Using our Minerals Wisely

- Using Natural Resources
  - The Demand
  - The Supply
  - Balancing the Supply and Demand

- The Earth and Its Wonders:
  - The Story of Mountains
  - The Story of Rivers
  - The Story of Underground Water

- Nature Filmstrips - Staley Studio:
  - Life in Foothills Zone
  - Life in Montane Zone
  - Life in Subalpine Zone
  - Mountain Evergreens, Part I
  - Mountain Evergreens, Part II
  - Rocky Mountain Wildlife, Part I
  - Western Wildflowers, Part I
  - Western Wildflowers, Part II
  - Work of Glaciers
  - The Aspen
  - Smokey's Misfortune

- The Earth and Its Neighbors in Space:
  - Astronomy Through the Ages
  - The Stars

Film - 16mm

Man and the Moon

EQUIPMENT AT THE LABORATORY SCHOOL

Astronomy Instruments

- Trippensee Planetarium (1)
- Spitz Planetarium (1)
- Telescopes (6)
    - Refracting, 2.4 in. (3)
    - Reflector, 8 in. (1) (clock-driven)
    - Reflector, 6 in. (2) (clock-driven)

Science Equipment

- Binoculars (30)
- Balscope - 10 power (1)
- Microscopes (36) slides - clear and prepared
- Micro-projector (1)
- Stereoscopes (2)
- Silva Instructor Compass (1)
- Silva Compasses
- Kill jars
- Insect mounting boxes
- Insect nets
- Magnifying glass 3 in. (12)
- Magnifying lens 3.5 power (41)
- Small animal cage
- Geology collection - mounted and unmounted
- Geology picks (4)
- Geology kits - school preplanning (10)
- Increment bore (1)

Weather Instruments

- Taylorscope
- Barometer
- Hygrometer (2)
- Sling Psychrometer (3)
- Cloud Chamber (1)
- Thermometers (6)
    - Max.-Mim. (4)
    - Outside (2)
- Tempscribe (3)
- Rain gauge

Revised 1/65

Projectors

- Overhead (1)
- Opaque (1)
- Slide and Filmstrip (1)
- Movie (2)
- Screens (2)
- Projector stand

Physical Education Equipment

- Volleyballs and nets
- Badminton set
- Bats and balls
- Horseshoes
- Kickballs

Miscellaneous

- Tape recorder (1)
- Record player (1)
- Duplicator and master sheets
- Typewriter
- Paper punch
- Paper cutter
- Stapler and staples
- Canteens
- Back packs
- Ropes for knot tying
- Piano (2)
- Auto harp

PROJECT SUPPLIES AT THE LABORATORY SCHOOL

Paper

- Newsprint, unruled, white
  - 8½ x 11, 12 x 18, 18 x 24, 24 x 36
- Duplicating, White, 8½ x 11
- Drawing, Manila, 9 x 12, and 12 x 18
- Drawing, White, 9 x 12, and 12 x 18
- Construction, miscellaneous colors, 9 x 12
- Penmanship, 8½ x 11
- School ¼ inch squared, 8½ x 11
- Drawing Manila, ½ inch squared, 9 x 12
- Tracing, 8½ x 11
- Wrapping, White, Roll

Markers

- With felt tip, black, red, blue, purple, yellow, green, brown, and orange
- Crayons, black and red

Adhesives

- Lepage's Glue
- Elmer's Glue
- Rubber Cement
- School Paste

Paint

- Tempra, Miscellaneous colors
- Brushes

Miscellaneous

- Plaster of Paris
- Charcoal Crayon
- Colored Chalk
- Shellac and cleaner
- Modeling clay
- Pencils - Black, #2
- Rulers - 12 inch and yard sticks
- Pointers - rubber tipped
- Scissors, 50 - 5 inch, sharp
- Thumb tacks
- Paper clips
- Paper fasteners - flat head #2
- Paper fasteners - round head #3
- File folders, letter size, 9 x 12
- Erasers - artgum

LIBRARY BOOKS AT LABORATORY SCHOOL

	# of Copies	Author and Title
500	1	Leonard, Exploring Science
507.2	1	Ashbaugh, Things to do in Science and Conservation
507.2	9	Davis, Scientific Instruments You Can Make
507.2	4	Patterson and Kraus, Thousands of Science Projects
523	1	Barlowe, A Child's Book of Stars
523	2	Jones, Life on Other Worlds
523	13	Marshack, The World in Space
523	1	Olcott and Mayall, Field Book of the Skies
523	1	Price, The Essence of Astronomy
523	1	Zim and Baker, Stars
549	1	Nininger, Minerals for Atomic Energy
549	5	Pough, A Field Guide to Rocks and Minerals
549	5	Zim and Shaffer, Rocks and Minerals
550	3	Bamow, Biography of the Earth
551.59	6	Burnett, Lehr, and Zim, Weather
552	1	Fenton, Rocks and Their Stories
560	2	Gamow, Creation of the Universe
560	1	Rhodes, Zim, and Shaffer, Fossils
574	2	Bennett, Nature Photography
574	1	Moore, The Book of Wild Pets
574	2	Comstock, Handbook of Nature Study
574	1	Peattie, The Rainbow Book of Nature
574.92	1	Zim and Ingle, Seashores
581	1	State Game and Fish Dept., Winter Guide to Rocky Mountain Brouse Plants
581	1	Zim, How Things Grow
582	1	Everett, Woodland Flowers: A Guide to Wild Flowers
582	1	Gottscho, Pocket Guide to the Wildflowers
582	5	Pesman, Meet the Natives
582	4	Petrides, A Field Guide to Trees and Shrubs
582	2	Roberts, Colorado Wild Flowers
582	3	Zim and Martin, Flowers
591	4	Murie, A Field Guide to Animal Tracks
591	5	Peterson, Wildlife in Color
591.92	1	Robertson and Graham, Strange Sea Life
594	1	Abbott, Sea Shells of the World
595.7	1	Bastin, Insects: Their Life Histories and Habits
595.7	5	Zim, Insects
597	1	Zim and Shoemaker, Fishes
598	1	Henderson, A Child's Book of Birds
598	5	Peterson, A Field Guide to Western Birds
598	1	Sprunt and Zim, Gamebirds
599	1	Burnett, Fisher, and Zim, Zoology
599	4	Burt and Grossenheider, A Field Guide to Mammals

	# of copies	Author and Title
745.5	1	Glantz, Scrap Fun for Everyone
796.54	2	Hammett, Campcraft
797.1	1	Wallace, Power Boats
797.1	1	Wallace, Sailing
821.08	1	Farlie, American Poetry Anthology
970.6	1	Hunt, Indian Crafts and Lore

Row Peterson Basic Science Books

Parker, The Sky above Us
Parker, The Sun and Its Family
Parker, Stories Read from the Rocks
Parker, Dependent Plants
Parker, Leaves
Parker, Seeds and Seed Travels
Parker, Trees
Parker, Insect Friends and Enemies
Parker, Insects and Their Ways
Parker, Birds

How and Why Wonder Books
Hoss, Stars
Hyler, Rocks and Minerals (3 copies)
Bonsall, Weather
Keen, The Microscope
Ferguson, Wildflowers
Rood, Ants and Bees
Rood, Insects
Mathewson, Birds

Date ____________________

Cabin Number ____________________

DAILY DORM INSPECTION CHECK OFF

The cleanliness of your dorm is your responsibility. The following are areas which should be clean and neat. The Hostess, Host or Dormitory Counselor should check the following before the group leaves for activity.

Bunks ____________

Toilets ____________

Sinks ____________

Floors ____________

Showers ____________

Suitcases ____________

Friday

Counselor and Host or Hostess will make final check for clothing or other articles which may be left by the children.

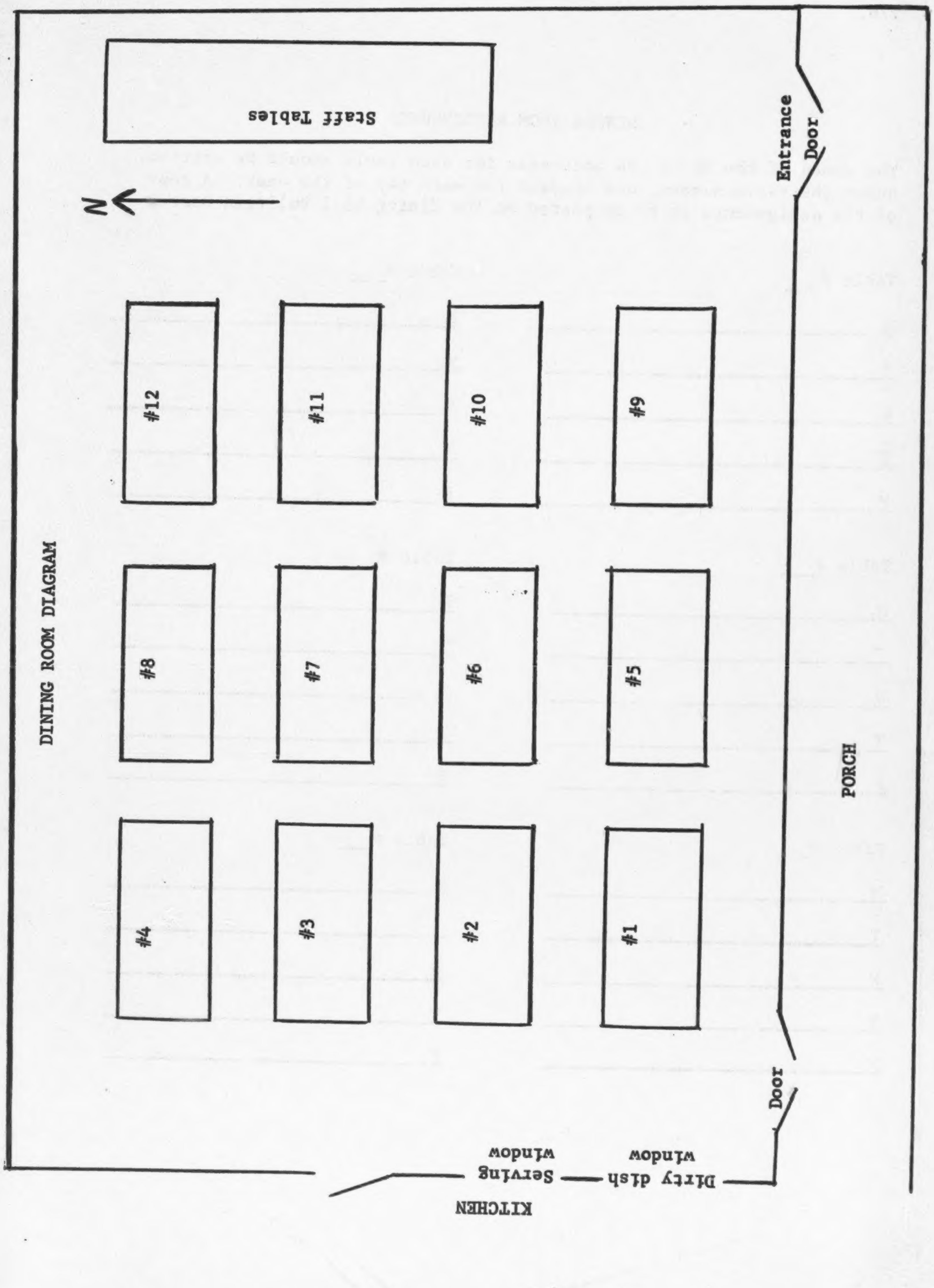
Neatest Bunks

1. ______________________________

2. ______________________________

3. ______________________________

Inspected by ______________________________


DINING ROOM DIAGRAM
Staff Tables
N
Entrance Door
#12
#11
#10
#9
#8
#7
#6
#5
#4
#3
#2
#1
PORCH
Door
Dirty dish window
Serving window
KITCHEN

DINING ROOM ASSIGNMENTS

The names of the hosts and hostesses for each table should be written under the table number, one student for each day of the week. A copy of the assignments is to be posted on the dining hall bulletin board.

Table #___

M ________________

T ________________

W ________________

T ________________

F ________________

Table #___

M ________________

T ________________

W ________________

T ________________

F ________________

Table #___

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Dear Parents,

In a few weeks, the sixth grade classes of ______________________________ School will have the opportunity to attend our Outdoor Education Laboratory School for a period of five days. The activities in this program will include experiences in conservation, nature lore, and exploration.

The week spent at the Outdoor Education Laboratory School can be one of the high spots of your child's educational experience. It is a carefully planned learning project that cannot be duplicated in the classroom. Conservation, the value of our watersheds and forest resources may be learned in their natural setting. Democratic group living in the laboratory school environment affords opportunities for healthful living, character development, and social adjustment which can rarely be found elsewhere.

The following are items of general information:

DATE:

School bus leaves at approximately _______ a.m., on ____________________,

and returns to school at about 2:00 p.m., on __________________________.

COST:

$15.00. This is the total fee and covers transportation, all meals, and insurance. The fee may be sent with the permission slip, or any time prior to the scheduled time of departure for the laboratory school.

SUPERVISION:

Students will be under the supervision of their classroom teacher and the principal of the Outdoor Education Laboratory School. The cooking is done by school cooks. A nurse is on duty at the laboratory school and doctors in Evergreen are available on call.

FACILITIES:

A lodge, dormitories with showers and lavatories, and a dining hall are provided for all children participating.

ADDRESS:

Jefferson County Outdoor Education Laboratory School
Star Route #2, Box 275
Evergreen, Colorado 80439

WHAT TO BRING:

Attached herewith you will find a list which will serve as a reminder of articles the student should bring with him to the laboratory school. Any equipment the student brings should be clearly marked with his name for easy identification.

WHAT NOT TO BRING:

The following items are not needed or allowed on the trip. In order to keep lost articles at the minimum, we request that these items be left at home:

- Watches
- Rings
- Money
- Radios or transistors
- Candy, gum, or food stuffs of any kind
- Flashlights
- Hunting knives
- Back packs
- Magnifying glasses
- Compasses
- Whistles
- Canteens

Any of these materials that are needed are already available at the laboratory school.

ITEMS NECESSARY FOR THE SCHOOL:

If for any reason it is necessary that your child be given medicine, please inform this office in writing as to the amount and frequency. The school staff will not administer medicine without your specific directions in writing.

Attached to this letter is a form that must accompany each child. Please check every item and be sure the form is complete.

If your child rides the bus or lives any distance from the home school,

DATE:

School bus leaves at approximately ______ a.m., on ________________,

and returns to school at about 2:00 p.m., on ________________________.

COST:

$15.00. This is the total fee and covers transportation, all meals, and insurance. The fee may be sent with the permission slip, or any time prior to the scheduled time of departure for the laboratory school.

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ITEMS NECESSARY FOR THE SCHOOL:

If for any reason it is necessary that your child be given medicine, please inform this office in writing as to the amount and frequency. The school staff will not administer medicine without your specific directions in writing.

Attached to this letter is a form that must accompany each child. Please check every item and be sure the form is complete.

If your child rides the bus or lives any distance from the home school, parents are requested to pick the child up after his arrival back on Friday. The children should arrive back between the hours of 2 and 3 p.m.

Thank you for your cooperation and support. Please feel free to call the school office if you have any further questions.

Sincerely yours,

____
Principal

OUTDOOR EDUCATION LABORATORY SCHOOL
PRINCIPAL'S CHECK LIST

MEETINGS:

__✓__ Principals of schools (if more than one school's classes will be in attendance)

__✓__ Program Coordinator scheduled for teachers' meeting

1/20 __✓__ Teacher's planning meeting with program coordinator

_____ Follow-up meetings (careful supervision by principal for implementation of instructional procedures)

_____ Special teachers participation planned

_____ Equipment and supplies needed

SCHEDULES:

_____ Week's schedules planned and approved

_____ Week's schedules typed

_____ Arrangements and schedules for children not attending

NURSE:

_____ Scheduled for morning of departure, for check-up of children

COMMUNICATIONS:

_____ Principal's Letter to Parents (Form #177)

_____ Permission to Attend and Emergency Information (Form #178)

_____ Student's Check List (Form #179)

_____ Other:

LISTS NEEDED:

_____ Three lists of students and teachers participating:

One for home school
One for Cashier (send with fee)
One for Principal of Outdoor Education Laboratory School

OTHER:

OUTDOOR EDUCATION LABORATORY SCHOOL

TEACHER'S CHECK LIST

PREPLANNING WITH CO-WORKERS:

_____ Meeting with program coordinator

_____ Teacher chairman selected (recommended at close of first meeting)

_____ Content of program planned and approved by principal

_____ Special teacher assignments planned

_____ Daily schedules planned and approved by principal

_____ Resource people selected and names given to principal for program coordinator

_____ Dorm counselors assigned

_____ Dorm assignments for children planned

_____ Dorm hosts and hostesses assigned (children)

_____ Dining room hosts and hostesses assigned (children)

_____ Plans made for supplies and equipment not at laboratory school

COMMUNICATIONS:

Following items sent to parents:

_____ Principal's Letter to Parents (Form #177)

_____ Student's Check List (Form #179)

_____ Permission to Attend and Emergency Information (Form #178)

Following items received from parents:

_____ Permission to Attend and Emergency Information (Form #178)

_____ Fees

ON DAY OF DEPARTURE:

_____ Personal equipment

_____ Teaching items needed

_____ Nurse check-up

_____ Corrected list of students participating:

Two copies turned into office with fees
One copy ready for Principal of Outdoor Educ. Lab. School

MISCELLANEOUS:

_____ Plans for students not participating

OTHER:

JEFFERSON COUNTY PUBLIC SCHOOLS   Form 181/Rev May 66

OUTDOOR EDUCATION LABORATORY SCHOOL
STUDENT'S CHECK LIST

Student's Name________________________________ Date______________

______ Bed roll or sleeping bag

PLENTY OF WARM CLOTHES:

_____ 1 pair of warm pajamas

_____ 3 changes of jeans, shirts, and underwear (if possible)

_____ 1 warm sweater

_____ 2 pairs of shoes) 1 pair heavy boot-type or leather shoes
) 1 pair of tennis or canvas shoes

_____ 1 cap or scarf for head covering

_____ 1 heavy jacket or coat for outdoor wear

_____ 1 raincoat or waterproof jacket (optional)

_____ 1 pair of gloves

_____ 1 pair of overshoes

ITEMS FOR HEALTH AND CLEANLINESS:

_____ 3 towels and washcloths

_____ Bar of soap

_____ Hairbrush and comb

_____ Toothbrush and toothpaste

_____ Kleenex or handkerchiefs for a week's use

_____ Chapstick

_____ Plastic bag, large, to hold soiled clothes

ITEMS NEEDED FOR STUDY:

_____ 3 pencils

_____ 1 ballpoint pen

_____ 1 notebook

MISCELLANEOUS ITEMS:

____

____

____

____

JEFFERSON COUNTY PUBLIC SCHOOLS Form 179/Rev May 6

MEDICATION PERMIT

In the event that a child who is attending a Jefferson County Public School is required to take any medication, please provide the correct number of doses of the medication and complete this form. For reasons of safety all medication will be stored in the school clinic and will be administered by authorized school personnel.

Child's Name

Medication

Dosage Times Given

Reason for Medication

THIS FORM SHOULD ACCOMPANY ANY MEDICATION.

Signed
Parent or Guardian

Doctor who perscribed medication

JEFFERSON COUNTY PUBLIC SCHOOLS Form 924/Rev July

OUTDOOR EDUCATION LABORATORY SCHOOL

STUDENT FEE COLLECTION REPORT

School:____________________ Teacher____________________ Attendance Dates:________

	STUDENT'S NAME	AMOUNT PAID		STUDENT'S NAME	AMOUNT PAID	A
1.			21.			
2.			22.			
3.			23.			
4.			24.			
5.			25.			
6.			26.			
7.			27.			
8.			28.			
9.			29.			
10.			30.			
11.			31.			
12.			32.			
13.			33.			
14.			34.			
15.			35.			
16.			36.			
17.			37.			
18.			38.			
19.			39.			
20.			40.			

(See Reverse Side)

DISTRIBUTION OF COPIES:

Original and duplicate copies to R-1 Cashier, accompanied by money collected.
Triplicate copy to Principal, Outdoor Education Laboratory School.

Jefferson County Public Schools

Form 829/Rev. Ma
6

	STUDENT'S NAME	AMOUNT PAID
41.		
42.		
43.		
44.		
45.		
46.		
47.		
48.		
49.		
50.		
51.		
52.		
53.		
54.		
55.		
56.		
57.		
58.		
59.		
60.		
61.		
62.		
63.		
64.		
65.		

	STUDENT'S NAME	Amount Pd. AM P
66.		
67.		
68.		
69.		
70.		
71.		
72.		
73.		
74.		
75.		
76.		
77.		
78.		
79.		
80.		
	Total - - - - - -	$

RECONCILIATION OF COLLECTIONS:

	No. of Students	Amount
1. Fully Paid	______	$______
2. Partially Paid	______	______
3. Free Students	______	______
TOTALS	______	$______

* Must Agree.

NOTE: All free students must be listed and shown as "FREE" in the amount column.

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Niedrach, R. J., and Rockwell, Robert B., *Birds of Denver and Mountain Parks*, Denver: Museum of Natural History, 1959.

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Teacher References

Freeberg, William H., and Taylor, Laren E., *Philosophy of Outdoor Education*, Minneapolis: Burgess, 1961.

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Publications

Parker, Bertha M., editor, *The Basic Science Education Series*, Row Peterson and Company.

Audubon Nature Bulletins, ($0.15 each) National Audubon Society, 1130 Fifth Avenue, New York 28, N.Y.

Colorado Outdoors, Bimonthly Publication of State of Colorado, Department of Game and Fish, Denver, Colorado

Conservation News, (free) National Wildlife Federation, 1412 Sixteenth Street, N.W. Washington 6, D.C.

Griffith Observer, Monthly publication of the Griffith Observatory, P.O. Box 27787, Los Feliz Station, Los Angeles 27, Calif.